JANE'S
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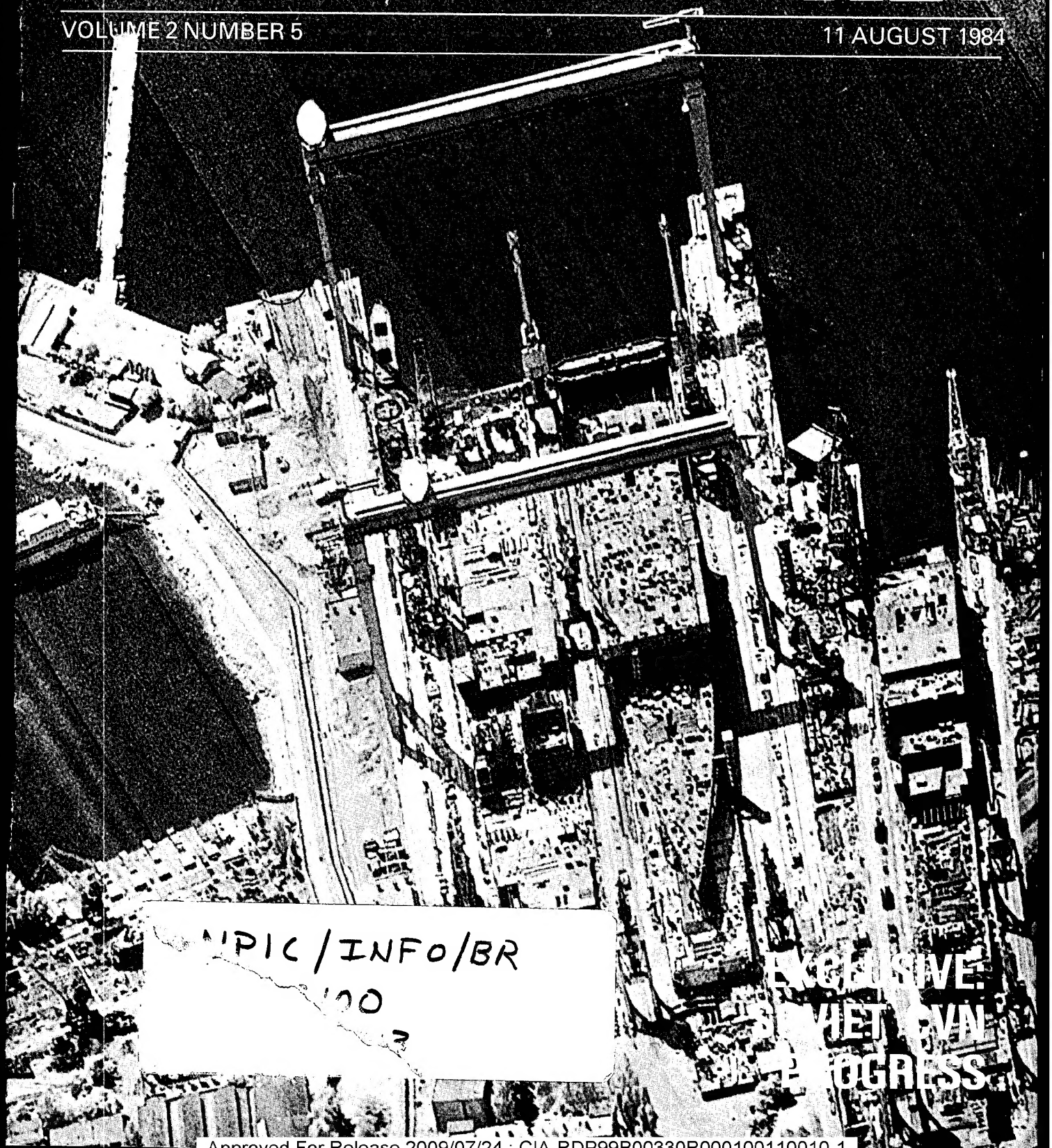
VOLUME 2 NUMBER 5 11 AUGUST 1984



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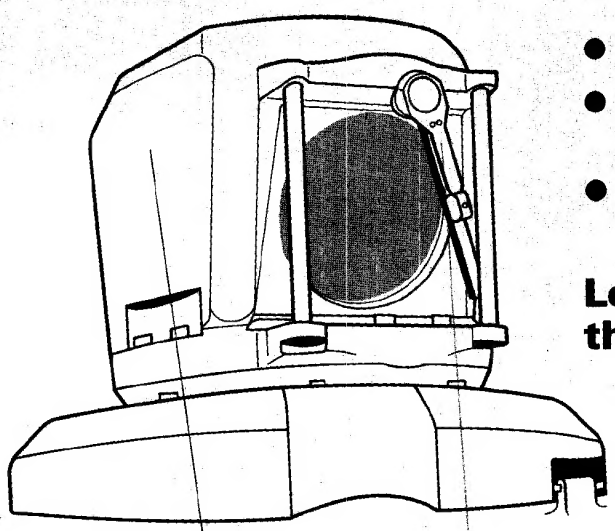

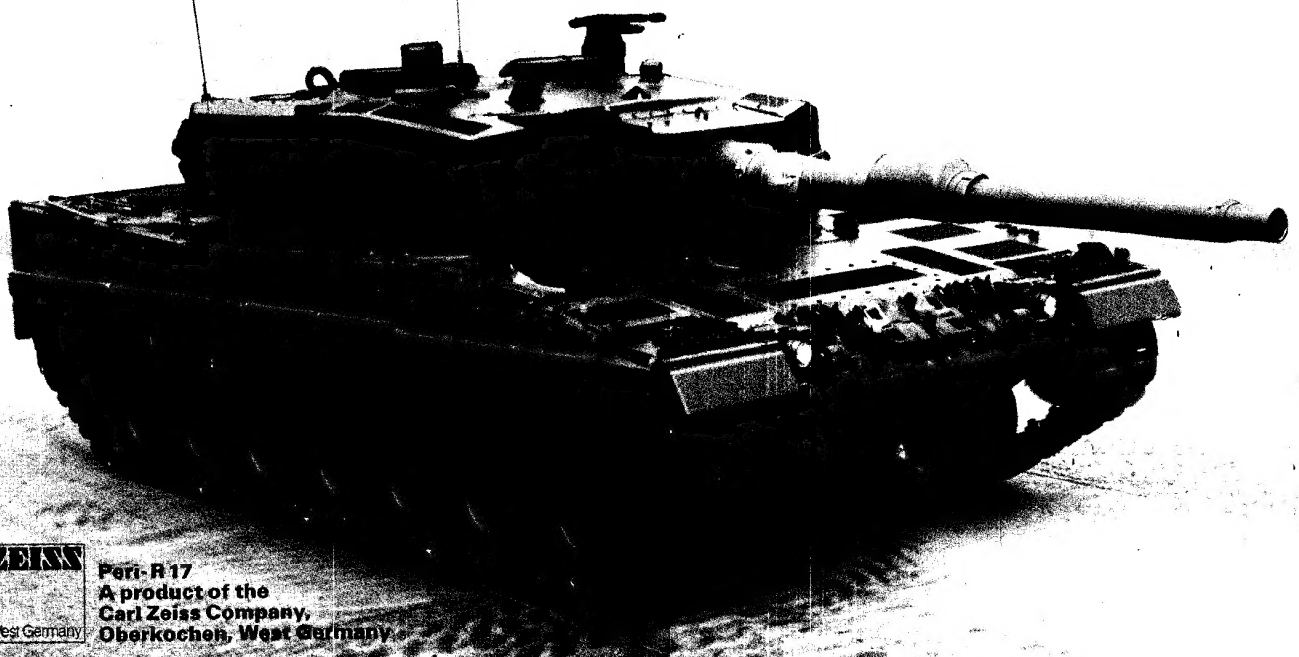

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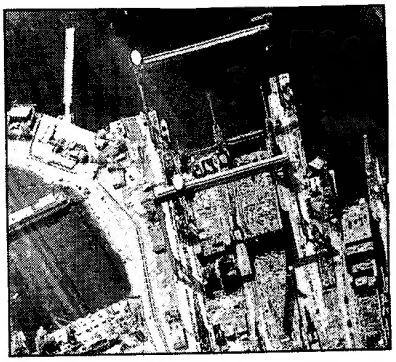

Front cover

Exclusive satellite picture of the 75 000 ton Soviet nuclear carrier under construction at Nikolaiev 444 shipyard in the Black Sea. *See pages 171-173*

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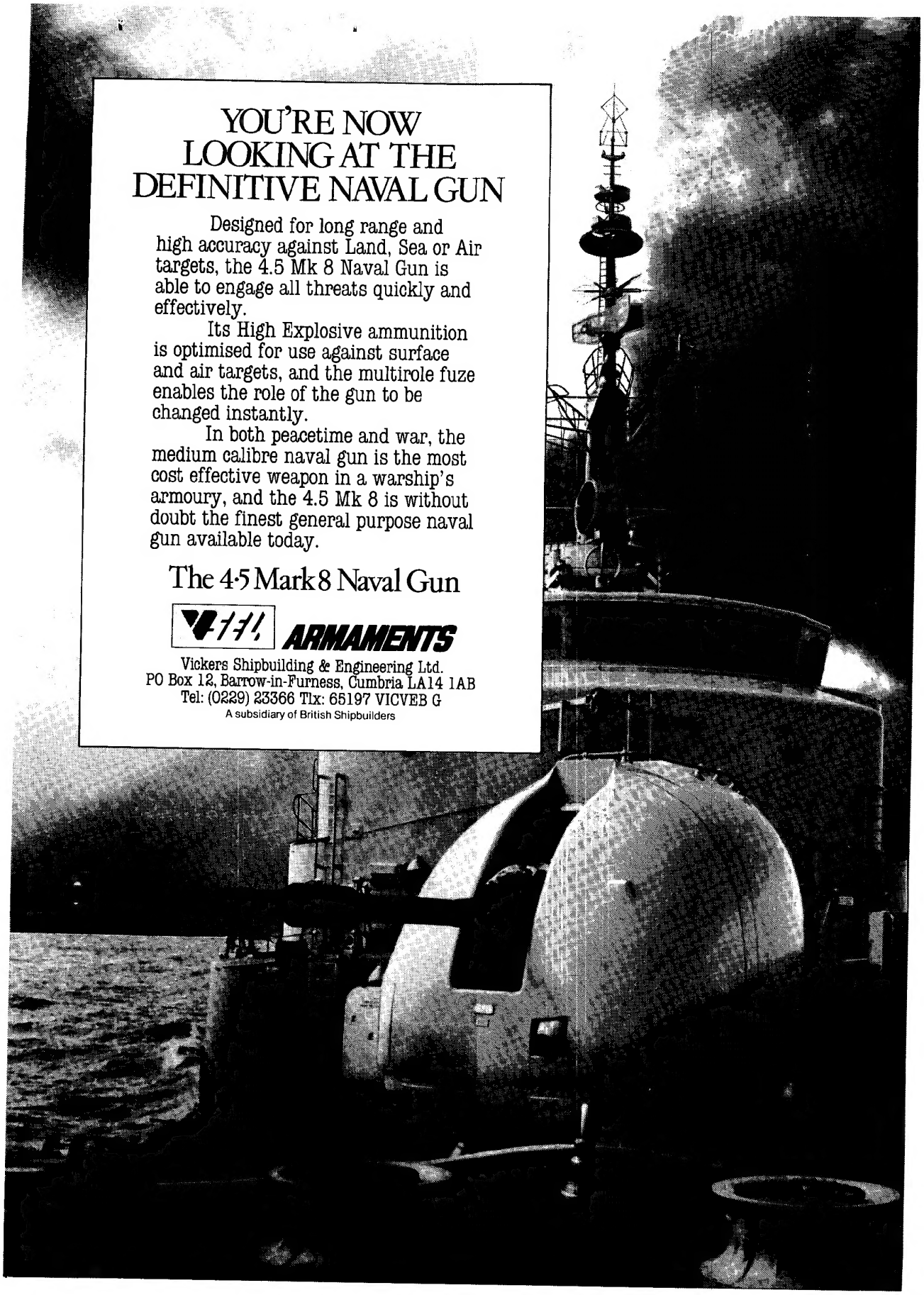

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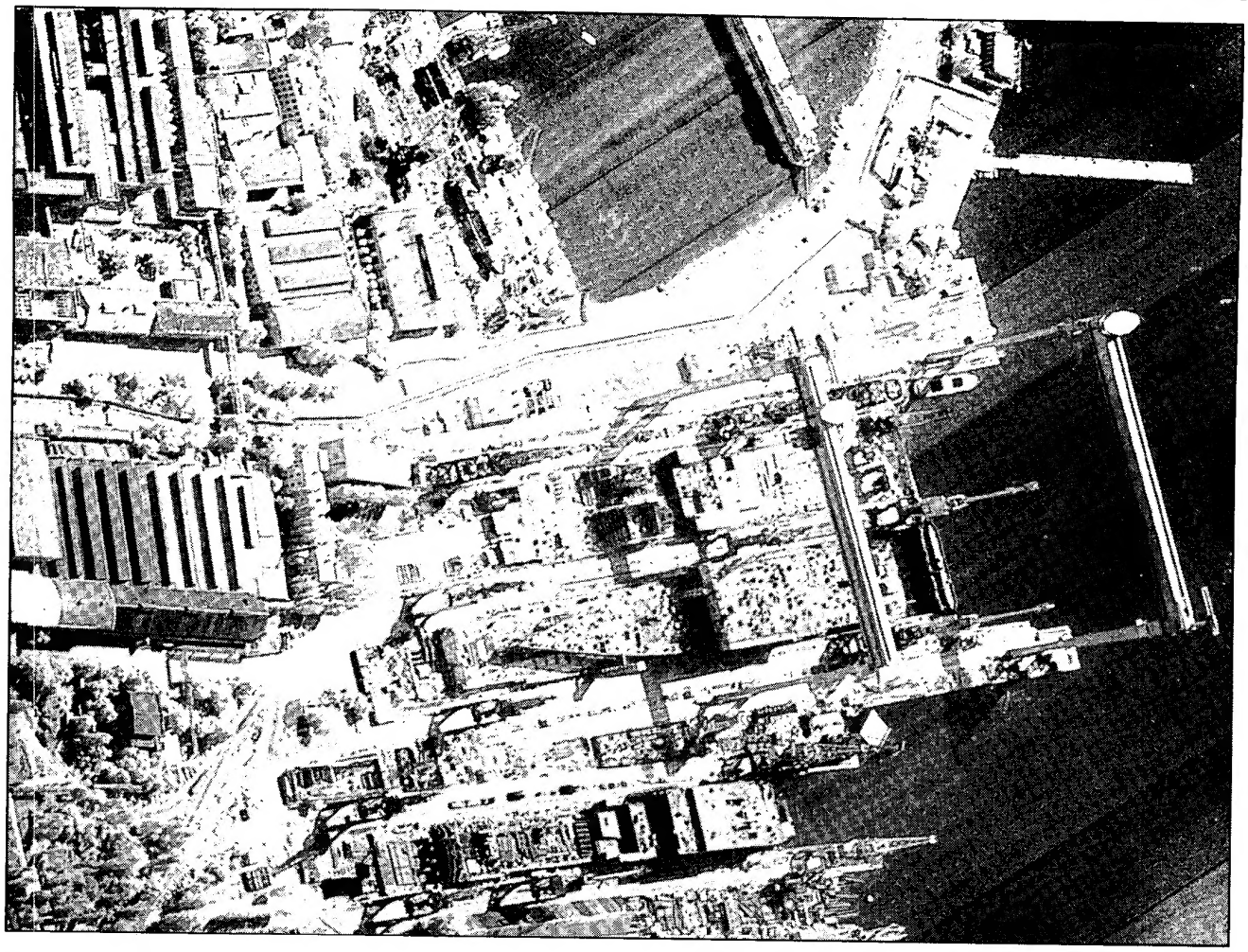


Satellite pictures show Soviet CVN towering above Nikolaiev shipyard

THREE EXCLUSIVE PICTURES, taken by a satellite only last month, show the Soviet Navy's 75 000 ton nuclear-powered aircraft carrier, codenamed BLACK COM 2 by NATO, under construction at Nikolaiev shipyard 444 on the Black Sea.

The photographs on pp 172-3 also show an amphibious landing ship of the *Ivan Rogov* class under construction in a nearby dock, and the fourth 43 000 ton *Kiev* class conventional carrier, *Kharkov*, continuing to be fitted out.

The pictures clearly indicate that the CVN is being built in two parts: the major portion, measuring 264 m in length, lies beneath the shipyard's two giant overhead gantry cranes which have a combined lift of more than 1000 tons.

The stern section, 73 m in length, is under construction on a slipway alongside. Analysts believe that this section will be floated out stern first and mated to the remainder of the carrier by September/October 1985.

The amidships section of the flight deck is nearing completion. One of the pictures indicates the position of vertical silo-launched SAM missiles forward of the superstructure.

These silos were shown on the artist's impression of the completed CVN, apparently named *Kremlin*, published in *Jane's Defence Weekly* on 28 July. Despite this, it seems unlikely, given the Soviets' preference for heavy armament, that the carrier will not be fitted with some SSM capability. The drawing also showed two deck lifts, three steam-operated catapults, and phased arrays, similar to the SPY 1A paired arrays on the US Navy's *Ticonderoga* class cruisers, on the superstructure.

Work on the ship began in January 1983 in the dock where the four *Kiev* class carriers were built. However, the pictures suggest that earlier reports that work on her has been speeded up are correct: clearly the CVN has been accorded priority by the C-in-C Soviet Navy, Admiral of the Fleet of the Soviet Union, Sergei Gorshkov. The pictures show railway lines carrying heavy material to the dockside and a profusion of heavylift cranes and scaffolding towers.

The latest estimate by *JDW* sources for sea trials for the CVN are 1988-9 with entry into full operational service around 1994. Tests with a full-scale CVN flight deck in concrete at an air base "in the Black Sea area" have been going on for three to four years, using arrester wires and an angled deck.

It seems likely that a navalised variant of the MiG-23 Flogger will initially operate off this carrier as a trial squadron, with the Sukhoi Su-27 Flanker all-weather counter-air fighter, carrying eight beyond-visual range AA-10 radar-homing missiles, on later ships of the class. It is believed that up to four and possibly eight strike carriers are planned, each with 75 aircraft on board, with the emphasis on fixed-wing interceptor/attack aircraft, making them potentially formidable adversaries for the US Navy's Carrier Battle Groups.

▲ *This computer-enhanced satellite photograph, taken at an oblique angle, shows the general layout of the Nikolaiev 444 yard in the Black Sea, with what appears to be a foundry in the foreground and assembly shops behind. Buildings housing technical staff lie alongside the dry dock where the 75 000 ton nuclear carrier is under construction. This dock, with twin mobile overhead gantry cranes, was where the four 43 000 ton* Kiev *class conventional carriers were built: it was, however, too small for the CVN, so the shipyard had had to resort to the unusual practice, for such a large vessel, of building in two sections. At the top of the picture, the stern section of* Kharkov, *the fourth* Kiev, *can be seen with work continuing on her fitting out. Nearby, an amphibious landing ship, apparently of the 13 000 ton* Ivan Rogov *class, is under construction.*

▲ *A more detailed photograph of the CVN dry dock. Analysts believe that the flight deck amidships has been completed, as has the hangar deck in both the bow and stern sections of the ship. The stern section, seen in the upper right-hand corner of the photograph, is due to leave her slipway in autumn 1985, floated out into the river stern first and then mated to the larger portion of the ship. It is thought the carrier will have two aircraft lifts, one aft of the island on the starboard side, and will have 75 aircraft when operational, with heavy emphasis on fixed-wing counter-air and strike attack aircraft. The ship will begin sea trials in 1988/9 and enter full operational service some time in 1994, it is thought.*

Dual option by Greece as Tornado is rejected

By Tim Wrixon

GREECE IS TO CHOOSE ITS new combat aircraft for defence requirements up to the year 2000 from the Mirage 2000, the F-16 or the F/A-18 Hornet. It is reported that the tri-national Tornado has been dropped from consideration. The likelihood is that two different types will be selected, probably the Mirage and one other. The Greeks do not want to be dependent on a single source of supply and spares provisioning.

The order, which could involve 80 to 100 aircraft, would be worth up to about £2000 million. The Greek Government is actively negotiating with the manufacturers for favourable terms. A final decision on the choice of aircraft is being further delayed until the end of next month to allow this to take place. Mr Papandreou, the Greek Prime Minister, is said to have pointed out that the Tornado had a "limited role as an air-to-ground attack plane" while Greece wanted a dual-role fighter bomber.

Meanwhile, Turkey is believed to be buying quantities of second-hand aircraft which could upset the balance of power between the two nations. Greece relies on its air superiority, as it is outnumbered on the ground. Whatever decision is made on its combat aircraft re-equipment plans, it will be some time before new aircraft are delivered, whereas the Turkish aircraft — probably F-5s, F-104s and F-4s — can be available more or less immediately.

●THE Royal Air Force is to equip its Queen's Flight with two British Aerospace BAe 146-100 aircraft. Delivery is scheduled for spring 1986. Each will be powered by four Avco-Lycoming ALF 502R-5 turbofans of 31 kN static thrust. The specification calls for optional wing root filler tanks.

Immigrant conscription

YOUNG IMMIGRANTS to South Africa will now be liable for compulsory military service after revision in the national service legislation. The first conscripts affected by the new law will be called up in January.

National servicemen are required for two years full-time and then remain on the reserve for 12 years. There has been criticism that many young South Africans have been avoiding military service.

Argentina's new jet trainer roll-out

ARGENTINA'S new jet trainer, the IA 63 built by Fabrica Militar de Aviones (FMA), was scheduled for roll-out on 10 August, according to a company statement.

First flight is planned for 10 October and FMA hopes to start production early next year. The Argentinian Air Force has 100 aircraft on order to replace Morane-Saulnier MS.760 Paris IIIs.

Belgium seeks add-on armour for Leopard 1 main battle tank

By Christopher F Foss

THE WEST GERMAN company Blohm and Voss has supplied and installed a prototype of an add-on-armour system for the Belgian Leopard 1 MBT and is now awaiting an order to equip the complete fleet of 334 tanks. The conversion will be undertaken at the Rocourt Arsenal in Belgium with the kits supplied by Blohm and Voss. The add-on-armour kit, called the Turm-Zusatz-Panezrung, consists of an additional layer of spaced armour added to the 105 mm gun mantlet, turret sides and rear, and applique armour welded onto the forward part of the turret roof. When fitted with the new armour a greater degree of protection is provided against attack from HEAT projectiles and ATGWs.

Blohm and Voss has already supplied 1845 kits to be fitted to the West German Army's 1845 Leopard 1A1 tanks which are then designated Leopard 1A1A1s. The Netherlands Army has ordered sufficient sets to be fitted to all its 468 Leopard 1 MBTs which are then known as Leopard 1-Vs (V standing for *verbeterd*, or improved).

India develops lighter field gun

A LIGHTER VERSION of the 105 mm Mk II field gun has been developed by the Indian Defence Research and Development Organisation (DRDO). The gun would be used especially for deployment on mountainous terrain and will meet the requirements of plains and desert warfare. The Organisation's budget, which stood at $4 million in 1961-2, has been increased to $180 million in 1984-5.

A project for full development of the advanced technology gas turbine engine, GTX, for the prestigious light combat aircraft is being undertaken by the DRDO. The demonstrator model of the advanced technology GTX has already been successfully completed.

▲ *Protected by anti-RPG netting and hidden by mirror glasses, a US Marine stands guard at the American Embassy in West Beirut. The Marines were on alert as diplomatic personnel moved to a safer site in the east of the city last month* (AP wirephoto)

'Arms to Lesotho not blocked', says S Africa

THE SOUTH AFRICAN Government has denied allegations that it is blocking arms shipments to Lesotho from a number of countries to force the Lesotho Government into signing a non-aggression pact with South Africa.

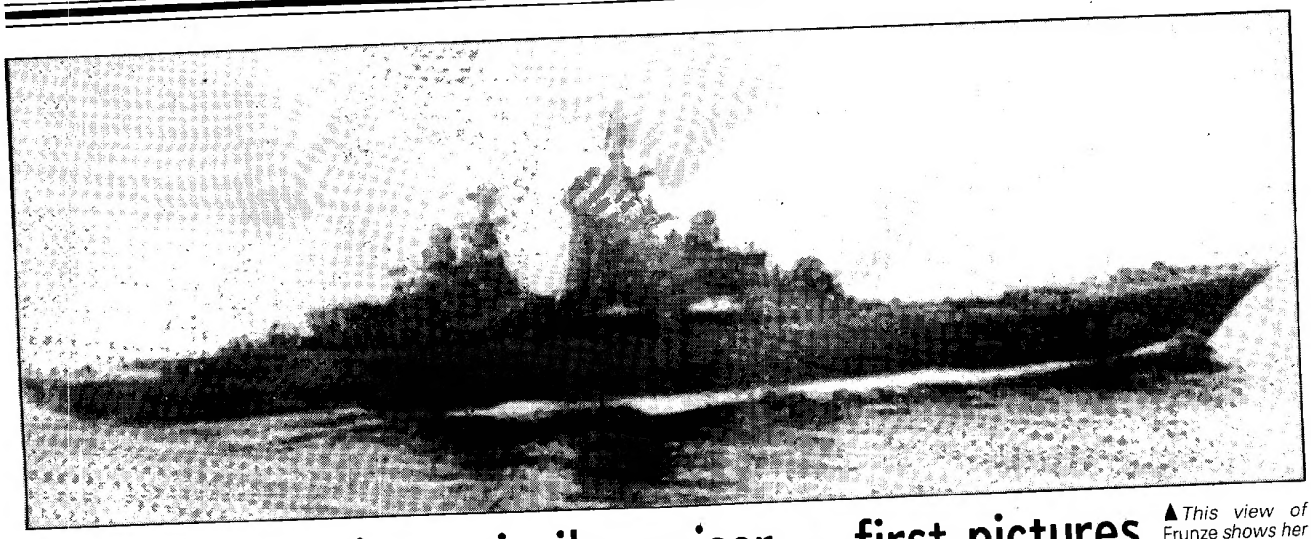
According to the South African Department of Foreign Affairs, the South African Government has no knowledge of any delay in the importation of these arms. Should this be the case, it adds, this would be because the Lesotho Government has failed to meet import conditions.

Australians' missile contract with USA

TWO INITIAL contracts have been signed with the US Navy for air-to-air missiles for the Royal Australian Air Force's new F/A-18 Hornet aircraft.

The Australian Minister for Defence Gordon Scholes said one contract, for AIM-7 Sparrow medium-range missiles, was for an estimated $A21 million. A second, for AIM-9 Sidewinder short-range missiles, was for an estimated $A5 million.

Missile deliveries would begin in 1986 to coincide with the formation of the first RAAF F/A-18 operational squadron at RAAF Base Williamtown, New South Wales.



▲ *This view of Frunze shows her twin 130 mm gun turret and extended aft superstructure* (Popperfoto)

Soviets' new Kirov missile cruiser — first pictures

By Nick Childs

THESE PHOTOGRAPHS, taken recently by the Federal German Navy, provide the first views of the second *Kirov* class nuclear-powered missile cruiser, *Frunze*, while she was on trials in the Baltic. The top photograph was taken before 1 May when the ship's pennant number was changed from 139 to 190. The ship is now believed to be in the northern Baltic.

The most obvious armament change, compared with the first of the class, is that the two single 100 mm guns, which were mounted aft on *Kirov*, have been replaced by a twin 130 mm turret, of the type fitted in the *Slava* class cruisers and *Sovremenny* class destroyers. The associated fire-control radar, Kite Screech, is the same as for the 100 mm guns.

The SS-N-14 anti-submarine missile system, which is mounted in the bows of *Kirov*, has not been fitted to *Frunze*, and the associated Eye Ball fire-control radars are missing from the forward superstructure.

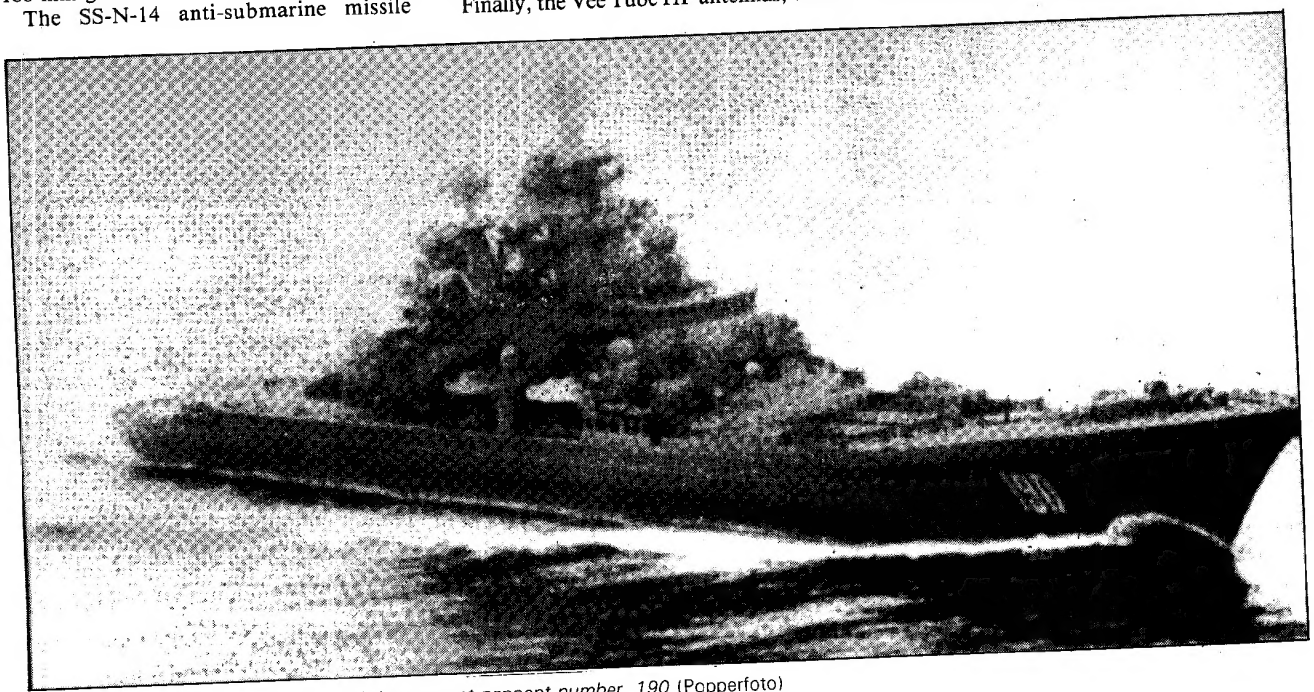
Frunze's medium- and short-range air defences have been enhanced when compared with those of her sister ship, and consist of a mixture of SA-N-4s and SA-N-8s, of the type fitted in the *Udaloy* class destroyers.

The ship's superstructure has also been noticeably altered. It has been extended further aft than in *Kirov*, leading to a resiting of the helicopter control cabin. The aft Top Dome radar, which provides fire control for the SA-N-6 missile system, has been raised somewhat compared with that in *Kirov*, possibly to improve its coverage.

Finally, the Vee Tube HF antennas, which on *Kirov* are mounted on a mast projecting from the aft radar tower, are apparently not fitted.

The main armament of the *Kirov* class consists of 20 SS-N-19 surface-to-surface missiles mounted in silos on the foredeck, and the SA-N-6 air defence missile system, which is mounted in 12 vertical launchers.

Frunze was laid down in January 1978, and is believed to have begun trials at the beginning of this year. She is expected to continue these trials for another three months. The ship takes her name from M V Frunze, a famous Soviet military strategist who, in 1925, succeeded Leon Trotsky as War Commissar. A military academy in Leningrad has also been named after him.



▲ Frunze *on sea trials in the Baltic with her current pennant number, 190* (Popperfoto)

Turkey opts for FP105 tank ammunition

By Christopher F Foss

AFTER EVALUATING A NUMBER of 105 mm armour piercing fin stabilised discarding sabot rounds for its M48A5 and Leopard 1 MBTs, the Turkish Government has awarded a contract valued in excess of $30 million (£22·93 million) to the Flinchbaugh Division of the American General Defense Corporation for the supply of 105 mm FP105 rounds.

The contract is for a period of 36 months and covers the supply of complete rounds of ammunition, parts for final assembly in Turkey, and equipment and tooling for Turkey's Makina Ve Kimya Endustrisi Kurumu to undertake production of the complete round.

In addition, the contract covers the transfer of technology and the establishment of a testing range. The programme has been agreed by the Turkish MoD in conjunction with the US Government's Tank Improvement and Modernization Program.

The FP105 105 mm round has been developed as a private venture by the Flinchbaugh Division and shares a number of common components with the Canadian Arsenals Ltd 105 mm C-76 APFSDS-T round, which has recently entered production for the Canadian Armed Forces (see page 182). Design features of the FP105 include a tungsten monobloc penetrator, nose windscreen and tail fins for stability in flight, and has a muzzle velocity of 1500 m/sec with the penetrator weighing 5·63 kg.

Libya accuses USA on Gulf of Sirte

LIBYA has accused the US Sixth Fleet of carrying out "provocative activities" in the Gulf of Sirte last month in which, according to an official spokesman for the Libyan armed forces, 164 planes entered territorial waters claimed by Libya north of Beida and Benghazi, and approached territorial waters north of Sirte.

The spokesman claimed that "at 8 o'clock on the morning of Thursday 26 July, some American aircraft penetrated the 32.30 parallel line to the south, covering a distance of between 10 and 15 km, and lasting five minutes. They were intercepted upon their penetration, and were chased out at exactly 8.05 hours".

The spokesman added: "the Libyan Arab armed forces are hereby announcing their readiness to defend the Gulf of Sirte, and confront the aggressor at whatever cost", according to the official Jamahiriya news agency, Jana.

Libya has also carried out what Jana described as "massive live ammunition manoeuvres" in the Tripoli region in which formations from the Libyan Air Force and Air Defence forces, as well as "militarised units", were involved.

Romania/Sudan talks

ROMANIA'S Deputy Minister for National Defence, Gen Victor Stanculescu, visited Khartoum last month for five days of talks with Sudanese officials, the official Sudan news agency, Suna, announced. Sudan's armed forces still have substantial quantities of Soviet-supplied arms but are reported to be short of spare units.

More Vickers MBTs for Nigeria

PRODUCTION of the first batch of 36 Vickers Mk 3 MBTs ordered by the Nigerian Government in August 1981 has now been completed and final deliveries will be made early next year. Production of the five armoured recovery vehicles and six armoured vehicle-launched bridges on the Mk 3 chassis is now under way and these are also expected to be delivered early next year. The first armoured recovery vehicle for Nigeria has been used at the British Army's School of Electrical and Mechanical Engineering, Bordon, to train Nigerian recovery crews.

It is understood that Vickers Defence Systems has now received a follow-on order for a second batch of Mk 3 MBTs and that work on these will begin next year. The new batch will be to the same standard as the first, and will be powered by the General Motors 12V-71T diesel coupled to the TN12 Mark V5 fully automatic transmission. The fire-control system will be the Marconi Command and Control Systems SFCS 600.

PLO 'reducing forces'

THE PALESTINE Liberation Organisation is reducing the number of its regular forces in an attempt to prune expenditure, according to reports from the Jordanian capital, Amman. The reduction involves the dismissal of all men who have joined the forces since 1 September 1983, while in another cost-cutting exercise, officers and men of the Palestine Liberation Army are to have their salaries cut.

Arms, ammunition for Lesotho still held by South Africans

SOUTH AFRICA is holding up delivery of a number of arms shipments to Lesotho in order to exert pressure on the Lesotho Government to conclude a non-aggression treaty with South Africa.

Shipments are from a number of countries and include light machine guns and ammunition from Britain. They have been held by the South Africans for several months.

According to the British Foreign Office, the British Government has raised the issue with the South African Government on a number of occasions. South African Prime Minister P W Botha was also made aware during his recent visit to Britain of the British Government's view that enduring agreements with neighbouring countries could not be reached under duress.

A spokesman for the Lesotho High Commission in London said the weapons are purely for internal security. The spokesman, Mr T Kotelo, added that the question of a non-aggression pact with South Africa is irrelevant because, in his words, "Lesotho is so small, powerless and geographically disadvantaged that we cannot even afford the luxury of dreaming of attacking South Africa".

Erratum

THE SECOND Royal Navy stretched Type 22 frigate *Beaver* was handed over by Yarrow Shipbuilders at Portsmouth on 18 July, not as reported in *JDW* 4 August.

Swiss investigate Pilatus sales

A SWISS Government enquiry has been ordered into the sales of Pilatus PC-7 trainers to war zones following allegations that the aircraft has been exported for offensive military roles.

Defence Minister Jean Pascal Delamuraz has set up a work group to examine exports of the aircraft, which is classified as civilian material under Switzerland's strict export rules.

The controversy stems from allegations made in the Swiss press. "An article said that the PC-7 could have been exported as war material", said a defence department spokesman.

Both Iran and Iraq have received PC-7s, and Guatemala has 12 aircraft on order, which led to complaints from Britain over a possible threat to Belize.

Although the PC-7 carries no internal armament, all aircraft are fitted with six underwing hardpoints as standard, giving the aircraft a possible 1040 kg load of fuel or weapons. It was this facility which led to the allegations, Pilatus believes.

A Pilatus spokesman said: "The aircraft is classified and certificated as a civil aircraft".

Commenting on reports that Britain complained about sales of the PC-7 to Guatemala, a Pilatus spokesman said: "It scares me very much if Britain is scared of these aircraft".

IN BRIEF . . .

INDIAN ADVANCED LIGHT HELICOPTER: India has formalised a contract for joint design and development of the advanced light helicopter (ALH) between Hindustan Aeronautics and MBB of West Germany. The multi-purpose helicopter will meet the joint-services requirements of the air force, army and navy, replacing the Alouette III and augmenting various Soviet types now in service.

KUWAITI SHIPS VISIT EGYPT: Four Kuwaiti gunboats have visited the Egyptian port of Alexandria. Like most Arab countries, Kuwait broke relations with Egypt after the Camp David Treaty with Israel, but political co-ordination has been gradually restored since the outbreak of the Iran-Iraq war and the 1982 Israeli invasion of Lebanon. Another Gulf state to have restored military links with Egypt is the United Arab Emirates, which has a number of cadets training with the Egyptian Navy.

COLOMBIAN FRIGATE: The Colombian frigate *Arc Independiente* (1500 tons) was commissioned at Howaldtswerke Deutsche Werft (HDW) shipyard on 27 July. She is the last of four armed with Exocet MM40 SSMs, built by HDW as Type FS 1500 ships ordered by Colombia, which are near sisters to two frigates built for Malaysia.

SIBERIAN RAILWAY: The second Siberian railway, which will link Baikal Lake and Amur River and be used for the transit of military *matériel* will be completed on 7 November, ahead of schedule. Less than 100 km remains to be constructed, although this section is facing technical difficulties, according to *JDW* sources.

SOVIET SHIP MOVEMENTS: The Soviet naval research ship *Admiral Vladimirsky* (9100 tons) passed through the Turkish Straits into the Mediterranean on 19 July accompanied by the 'Krivak II' class frigate *Razitelny* and the 'Krivak Is' *Pylky* and *Bezzavetny*. The submarine rescue ship *Elbrus* (19 000 tons) transited the Straits back into the Black Sea on 25 July, as did a 'Lama' class missile support ship on 26 July.

SP PONTOON BRIDGE: Production of the Japanese Ground Self Defence Force's Type 70 SP pontoon bridge is to be completed with the order, this year, of two vehicles. A total of 39 Type 70s were produced. The JGSDF plans to start development work on a new SP floating bridge in FY85 to cope with the introduction of the new heavy main battle tank which is to be standardised in FY88.

SPANISH FRIGATES: Launch dates for the three Spanish Navy US 'FFG 7' class frigates have been announced as October (*Santa Maria* F 81), January 1985 (*Niña* F 82) and August 1985 (*Pinta* F 83) with commissionings due in December 1985, November 1986 and October 1987, respectively.

JASDF TO ORDER F-15J/DJ: Japan's Air Self Defence Force expects to order about 36 F-15J/DJ Eagle fighters in FY85, as part of the largest aircraft procurement plan ever put forward for approval. Current estimates include the F-15s, six C-130H Hercules, one CH-47 helicopter, seven T-2 advanced trainers, two MU-2 search and rescue (SAR) aircraft and nine Boeing Vertol 107A SAR helicopters. The JASDF plans to purchase a total of 155 F-15 Eagles, 110 of which have already been authorised. The current order for 36 will be to form an additional squadron.

SAUDI-OMAN TALKS: Saudi Arabian Defence Minister, Prince Sultan bin Abdul Aziz, and Foreign Minister Prince Saud al Faisal, have held talks in Oman with Sultan Qabus and Deputy Premier for Defence and Security Affairs Fahr bin Taimur. The talks dealt with the strengthening of bilateral co-operation within the framework of the Gulf Co-operation Council.

New Zealand cools the ANZUS argument

By Frank Cranston in Canberra

NEW ZEALAND'S NEW LABOUR PRIME MINISTER, Mr David Lange, appears to be moving quickly to defuse differences in his party's attitude towards and ANZUS Alliance with the USA and Australia.

The basic issue is the Labour Party's commitment to ban visits to New Zealand by US warships. The policy calls for the exclusion of nuclear-powered and nuclear-armed warships of the US Navy. The USA has made it clear that the exclusion of its ships from New Zealand ports would make the Alliance unworkable. Australia has applied its own pressures on New Zealand.

In his first formal statement on the issue, Mr Lange has differentiated between nuclear-powered ships, which will be excluded, and those with nuclear weapons on board, the presence of which the Americans have traditionally refused to confirm or deny.

It is expected here that the New Zealand position will follow that of Australia in not asking about weaponry even though their presence may be suspected. On the nuclear-powered issue, the USA is prepared to be more accommodating. Washington has also softened formal statements on the issue. President Reagan has said he does not believe the issue will cause a confrontation.

In mentioning only nuclear-powered vessels, Mr Lange is believed to have sent a clear signal to Washington that the difference should avert difficulties over the issue. The Labour Party gained office with only 43% of the vote in New Zealand's first-past-the-post voting system.

Royal Navy steps up Phalanx training

THE ROYAL NAVY has bought a close-in weapon system maintenance trainer (CIWS-MT) to improve maintenance and training for its Vulcan Phalanx anti-missile Gatling gun systems.

As an emergency measure, in May 1982, the British bought five 20 mm Phalanx guns from the US Navy, two each to protect the carriers HMS *Invincible* and HMS *Illustrious* against Exocet missile attacks, and one for training at HMS *Excellent*, the gunnery school. The new CIWS-MT has been installed at the training establishment, HMS *Collingwood*.

The main purpose of the CIWS-MT is to provide realistic simulation of the test equipment and procedures, but it also provides hands-on operator training. The Royal Navy has cut the training period from 27 to 15 weeks. The US Navy has 36 of these trainers in service.

CBU-87/B munitions are 'highly effective'

THE ARMAMENT DIVISION at Eglin AFB has reported that initial production units of the new CBU-87/B combined effects munitions have "demonstrated high effectiveness", according to the manufacturer, Aerojet Ordnance Co of California.

The flight tests were designed to "verify that design modifications, incorporated to ease the transition of the CEM into automated high-rate production, did not degrade the overall weapon performance", the company said, adding that "preliminary analysis of test results indicates that the function rate of CEM exceeded performance goals".

The CEM began low-rate production in August 1983, and will be turned out with a new automated line under a $282 million early funding.

Japanese airbase defence squadron formed

A NEW AIRBASE defence squadron has been organised at Chitose Air Base in Hokkaido, Japan. This squadron has a strength of 80, and is equipped with Type 81 Tan-SAMs, Stinger portable SAMs and 20 mm Vulcan air defence systems.

The squadron is controlled directly by the Northern Air Defence Force Headquarters and will initially conduct the study and test of organisation, training, operation, and logistic support of air defence units. The squadron consists of headquarters, firing unit and maintenance unit.

Israel 'selling arms to China' report

ISRAEL is selling arms to Peking through a third country, according to the Tel Aviv daily *Yediot Aharanot* in a report on 18 July. Quoting British intelligence sources, the paper claimed that China was also interested in obtaining information on Israel's successful destruction of Soviet-supplied weapons and defence systems used by Syria during the 1982 invasion of Lebanon, with a view to strengthening its defences along the Sino-Soviet border.

The paper, usually well-informed on Israeli military affairs, said that Israel was helping China to re-evaluate its conventional and chemical weapons capability "in order to overcome Soviet weapons, should the need arise".

It also claimed, quoting the unidentified British sources, that Peking was concerned about a sale of chemical weapons by Israel to Taiwan, saying that Israel had begun manufacture of gas weapons after Egypt has used them in the 1960s' civil war in Yemen.

Australian Defence Force strengths

THE TOTAL STRENGTH of the Australian Defence Force was 71 292 at the end of May 1984, compared with 71 227 at the end of April.

The strengths of the individual services were: navy 16 566; army 32 212; and air force 22 514.

At the end of May, reserve forces with training obligations totalled 32 990.

'CW gas factories' export queried

THE WEST GERMAN Government is to check the export licences of two companies which are making anti-insect powder production installations for Iraq. US experts have suggested that the installations could be misused for the manufacture of poison gas.

Japan's defence budget

JAPAN'S DEFENCE budget escaped the strict public spending cut-backs applied by the government last week. Defence spending will rise by 7% next year.

New Indian ordnance factory

AFTER LAYING the foundation stone of the $420 million ordnance factory which will manufacture infantry combat vehicles in Andhra Pradesh, the Prime Minister Indira Gandhi warned against the internal and external dangers threatening the country.

The 35th ordnance factory in the country is being established with Soviet collaboration. It is expected to become operational in about four years' time.

The factory, according to Defence Minister R Venkataraman, will be a giant stride towards the goal of self-reliance and self-sufficiency in equipping the armed forces with the latest types of combat vehicle. A technical board has been constituted to give greater autonomy to defence production units in the country. The annual aggregate production of these units has already exceeded $2400 million.

Earlier, Mrs Gandhi stressed the need for strengthening the three wings of the armed forces with sophisticated arms and weapons to keep them abreast of the technological developments.

PLA changes to provide China with power base

By Gordon Jacobs

MAJOR EFFORTS ARE UNDER WAY in the People's Liberation Army (PLA) to accomplish fundamental reforms and changes which will ultimately provide China with the military power to become a major 'regional' military force. The recently announced agreement with the USA to acquire the I-HAWK surface-to-air (SAM) system and the MGM-71 TOW anti-tank missile is following a process of "selective purchasing" begun shortly after termination of the UK agreement to modernise China's 'Luda' class destroyers.

Other significant purchases of Western military hardware recently have included the following agreements: AMC Jeep for the manufacture of Jeep vehicles by a joint venture firm; Steyr-Daimler-Puch of Austria for Chinese production of 10 000 trucks, with follow-on production likely; purchase of Creusot-Loire 100 mm gun mount (at NATSEDES '83); and agreement in mid-June between the China State Shipbuilding Corp and Ishikawajima-Harima Heavy Industries to co-operate in the modernisation of China's marine diesel engine production.

While China continues to acquire Western and Japanese technology for dual-use in the civilian and military fields, it has continued with limited production of Soviet equipment and hardware acquired over the last decade. These projects include: Hong-6/Tu-16 Badger-A medium bomber (8-10 annually); J-7/Fishbed-C; Yun-7/An-24; and Yun-8/An-12 Cub. A 50 helicopter assembly programme for the Z-9/Dauphin II (SA.375N) is completing, as is a similar programme in which Bell Helicopters is supporting China's offshore oil exploration programme. China is also producing, in limited numbers, the J-8/Finback-A fighter, while test and development continues on two further aircraft (the F-10 delta-wing fighter and an F-12 sweptback-wing development).

Besides well-known ground equipment of Soviet origin produced in China (Type 59 MBT, etc), new programmes exist, producing the HJ-73 (AT-3/Sagger) ATGM (also exported to Egypt), and the relatively new Type 70-1 LAW anti-tank weapon (similar to the US M72 and probably acquired through Vietnam some years ago).

While hardware sales tend to make more headlines, China has been actively engaged in making other reforms in the last few years. These include changes in training and command, control and communications systems, and retirement of elderly commanders.

In the last few years, the Chinese have also discussed the issuance of rank again in the PLA; an issue which continues to be slowed by China's bureaucratic process and other priorities. However, there remains a good possibility of this coming into practice next year.

Certainly China will continue to encourage military technology agreements with the USA and Europe.

Aviojet trainers for Honduras

THE AIR FORCE OF HONDURAS, which already has a single CASA C-101 Aviojet trainer, has ordered five more. They are said to be unarmed training versions, and the Honduran authorities say the new aircraft will have no role in the local civil war.

Nigerian transports

THE NIGERIAN Air Force has received the first two of five Italian-made G-222 transport aircraft ordered in 1982, which are to be stationed at the Ilorin Air Base, to provide tactical support for the army and navy.

Improved training for Mirage pilots

By Antony Preston in San Diego

FOR THE FIRST TIME combat pilots flying the most advanced French Mirage jet fighters will be able to train on ranges like the air combat manoeuvring instrumentation (ACMI) facility at Decimomannu, Sardinia. The new capability results from a contract awarded to Cubic Corp by Matra, the French firm which makes the Magic 550 missile for the Mirage. Mr Bob Moore, Vice President (Tactical Test and Training) at Defense Systems, said the contract calls for Cubic to design, develop and deliver special aircraft instrumentation systems (AIS) pods for the Mirage.

"We have worked with Matra officials for three years leading up to this effort", he said. "The corporation included tests at the Decimomannu facility last autumn to help develop simulation of the Magic 550 missile."

The AIS pod will replace the Magic 550 on its wing-mounted launcher. The pods relay aircraft weapons, attitude and velocity data to system ground stations. In addition to providing accurate positioning information on the aircraft to controllers on the ground, they enable pilots to simulate missile firings during training missions on Cubic's ACMI and tactical air crew combat training system (TACTS) facilities.

British Commandos' new flexibility

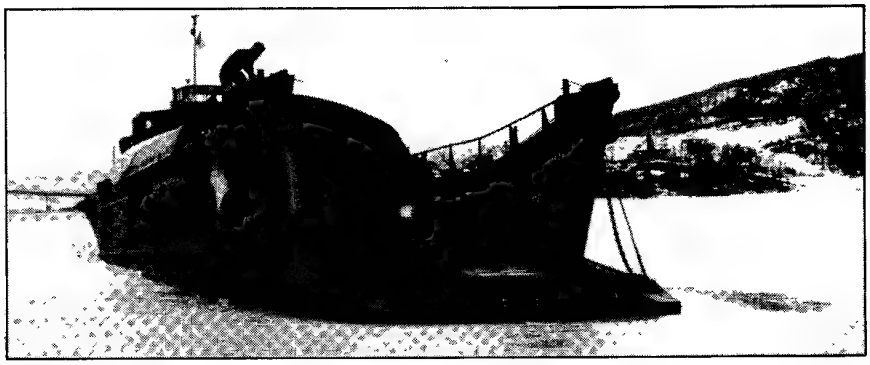
539 ASSAULT SQUADRON joined 3 Commando Brigade, Royal Marines, on 30 July. This squadron of LCUs and other craft provides the brigade with greater flexibility, not only in its commitment to north Norway but on any amphibious deployment.

'539' was born out of trials in Norwegian winters and the marked success of 9 Task Force LC Squadron in the Falklands (Malvinas).

Using techniques practised in Norway, the *ad hoc* squadron proved the value of landing craft in many roles — it put ashore five battalions, provided much of the logistical lift, and its Rigid Raiding Craft inserted SAS and SBS patrols and landed men for a major diversion raid.

The craft can operate in weather and temperature conditions which have brought land and air transport to a halt. Each of the two LCUs can carry 70 troops or combat stores, while the smaller craft, four LCVPs and 24 RRCs, can, between them, lift another six troops.

The squadron is self-sufficient with its own technical support troop, commanded by a naval engineer officer. The squadron HQ and communications, being afloat in the LCUs, are tasked through their cell with brigade HQ.



▲ *An LCU of 539 Squadron can operate in ice up to 30 cm thick, as seen here during trials. This ice is strong enough to carry a 4 tonner, and BV 202s could be off-loaded on to even thinner ice*

Five companies compete for new US EW system

By Hugh Lucas in Washington

THE US AIR FORCE'S Aeronautical Systems Division (ASD) has named five contract teams to develop a new generation electronic warfare system for advanced navy and air force aircraft.

Each of the teams is receiving about $3 million for the work on the Integrated Electronic Warfare System (INEWS) which is expected to be a multi-billion dollar programme to provide future combat crews with timely warning and automatic countermeasure response, the ASD said at Wright-Patterson AFB, Ohio.

The first phase will include concept definition and advanced engineering together with preliminary full-scale development work. The teams in the four-year Phase One are Hughes-Loral, ITT-Litton and Raytheon-Northrop, each receiving $3 million; TRW-Westinghouse with $2 999 881; and Sanders-General Electric with $2 998 873. AIL and E-Systems was the only bidding team of the 33 firms contacted that did not receive an award.

One of the joint venture teams will be picked for full-scale development and the two members will compete for the production award. Full production is planned for 1993.

Turkish talks with Saudi Arabia and Spain

TURKISH DEFENCE Minister Zeki Yavuzturk has visited Saudi Arabia and Spain for talks on military co-operation. In Saudi Arabia, where he met King Fahd, the Minister discussed prospects for joint defence industry ventures, naval co-operation and the training of Saudi military personnel in Turkey. A Saudi military delegation is to visit Turkey next month for further talks on the proposed joint manufacturing ventures.

In Spain, according to radio reports, Mr Yavuzturk was expected to discuss the possible purchase of the Teruel multiple rocket launcher, AMX-30 tanks, C-235 transport aircraft, and light vehicles. Co-operation in naval and air defence issues was also on his agenda, he said before departing for Madrid.

His trip followed a visit by Adm Liberal Lucini, Chief of the Spanish Defence Staff, to Ankara at the beginning of July.

India's Southern Air Command opens at Trivandrum

OPENING the headquarters of the newly formed Southern Air Command of the Indian Air Force at Trivandrum in Kerala last month, Prime Minister Mrs Indira Gandhi discussed the increasing militarisation of the Indian Ocean and the danger the nation faced from all sides.

The Southern Air Command will now look after the air defence of the entire peninsula, the seas surrounding it and the island territories, and relieve the pressure of the overworked Central Air Command based in Allahabad. The Southern Command of the army is headquartered in Pune in Maharashtra, and the naval headquarters of the Southern Command is in Cochin in Kerala.

Although India pursued a policy of peace, said Mrs Gandhi, it was not entirely within the powers of one country to avoid war. "We can only say that we will not commit aggression but we have to be alert, vigilant and fully prepared to meet any aggression committed against us", emphasised the Prime Minister.

Mrs Gandhi said that she wanted the country to be self-reliant in defence production. While no country could be totally self-sufficient, the aim was to make the essentials indigenously and imports, if any, to be made on "our own terms".

USA may export 'soft' equipment to India

FOLLOWING THE VISIT of Indian General A S Vaidya, Chief of Army Staff, to the USA (*JDW* 28 July), the Pentagon is ready to permit export to India of "soft" military items ranging from night vision devices for tanks and APCs, to electronic warfare and C³I items.

Traditional hardware, such as artillery including the M109A2 155 mm self-propelled howitzer produced by Bowen-McLaughlin-York of Pennsylvania, might also be exported.

Two Spanish minelayers retire

TWO TORPEDO and minelaying launches have been scrapped from the Spanish naval list. They are now named *YTM-01* and *-02*, based in Cartagena, and were the former *LRT-3* and *-4*. Both craft were rated as *lanchas para fondeo de minas y torpedos* (launches for mine and torpedo laying). *LRT-3* and *-4* were delivered on 18 February 1956 and served for a long time at Alcudia, Balearic Islands, where they worked in connection with torpedo-pursuit launch *ST-5*.

In the 1970s, when the torpedo range lost priority, both recovery craft were allocated to Submarine Base, Cartagena, as tenders.

Wooden-built *LRT-3* and *-4* had a stern ramp to receive torpedoes on board and could accommodate six long 21 in (53·34 cm) torpedoes, two per stern side plus two on the ramp itself. Displacing 58·2 tons, they measured 17·7 m long and 2·2 m wide.

Under the present numbering system in the Spanish Navy, *YTM-01* and *-02* can be translated as: Y: harbour service craft (as in NATO single letter system); TM: torpedoes and mines; O: 'O' class (there is also a '1' class in this rating).

India repels Kashmir incursion by Pakistan

INDIAN AND PAKISTANI forces were engaged in a brief but fierce exchange in the Nubra Valley area of western Ladakh in north-eastern Kashmir during mid-June, *writes Pushpindar Singh.*

Indian Army patrols reportedly discovered Pakistan Army positions and bunkers on the slopes of the mountains overlooking Nubra during May. The strategic Karakoram Highway between China and Pakistan passes nearby.

Warnings were given to the Pakistani forces but the positions were strengthened. The Indian Army then staged a high-altitude air drop of para commandos above and behind the Pakistani positions and fierce fighting took place at heights of 18 000 ft (5500 m). Casualties were high on both sides, but eventually the Pakistani positions were abandoned. Now Indian troops are posted in the area on a semi-permanent basis.

The area is not normally occupied by Indian troops, but is patrolled in the summer months by the Ladakh Scouts, a regular force recruited from the Ladakh area.

▼ *The first three of 95 Antonov An-32 Cline tactical transports ordered by the Indian Air Force were delivered last month. Inspecting the aircraft at Delhi's Palam Airport were, from left to right: Air Chief Marshal Dilbagh Singh, Chief of Air Staff; Grp Capt C R Ghosh, who will command the first An-32 squadron; and Minister for Defence R Venkataraman. Five squadrons and the Para-trooper Training School will eventually fly the An-32 (JDW 4 August)*

Escalation claim in China-Vietnam conflict

THE CHINA-VIETNAM border conflict has grown into a sizeable military action, with regular forces of divisional strength engaged on both sides. Following a day-long attack on Yunnan Province by Vietnamese forces, the New China News Agency accused Vietnam of intentional escalation.

The attack, which started on 12 July with a heavy artillery barrage, almost forced Chinese troops to withdraw, but a counter-attack was made after reinforcements arrived.

China has expressed concern that Vietnam could introduce extra troops in the area from units withdrawn from Kampuchea.

Hanoi broadcasting accused China of launching an artillery, mortar and rocket bombardment against Hatem Province in northern Vietnam during early July, maintaining it until 15 July. Nearly 10 000 shells were fired, claimed the report.

Late price reduction clinched Roland deal

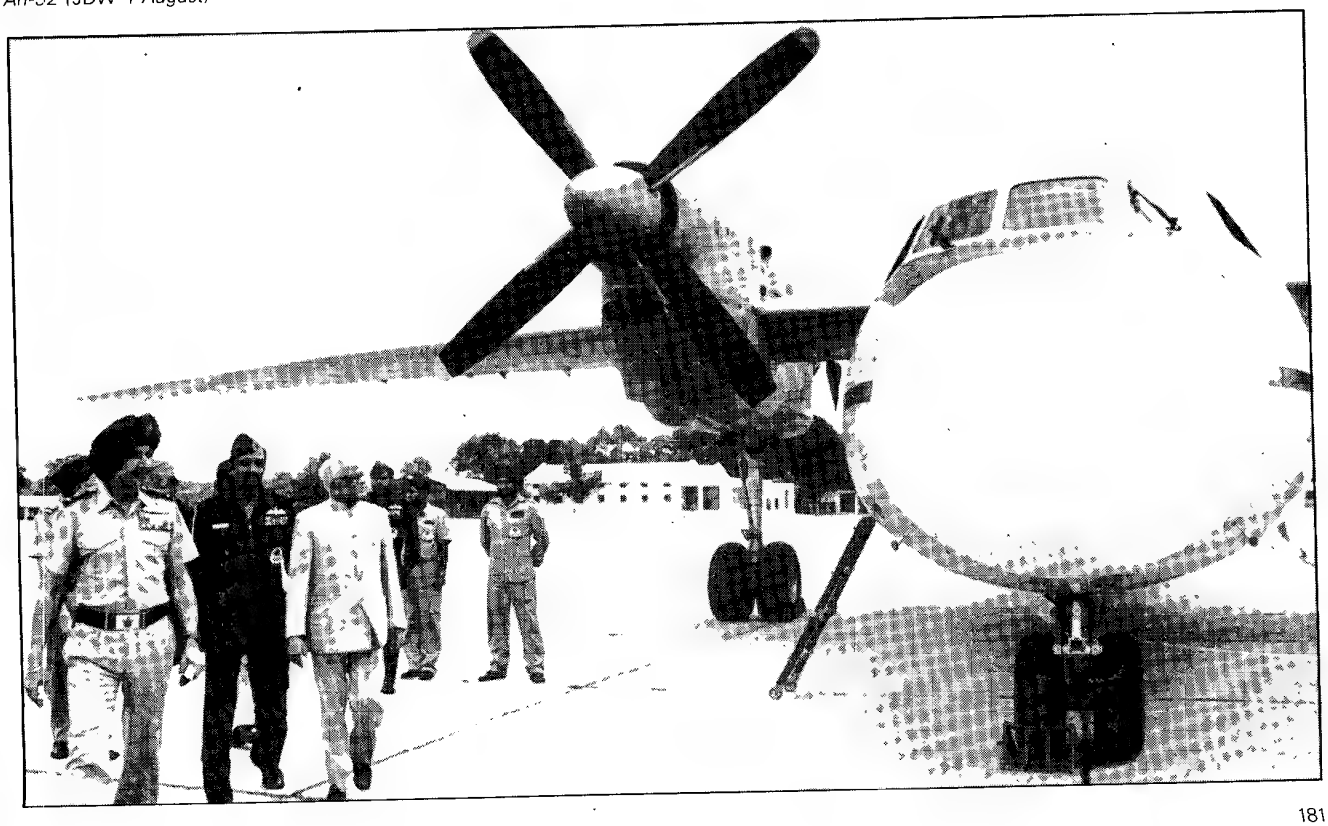
SPAIN'S SELECTION of the Euromissile Roland low-level anti-aircraft system was determined by a last minute price reduction of about 4%, worth some 1120 million pesetas (£5·23 million) to the customer.

Nearly 10 000 million pesetas (£46·67 million) in Roland contracts will go to EN Santa Barbara for mechanical and chemical products such as explosive and propellants. More than 6000 million pesetas (£28 million) will go the Division de Electronica of the state-owned INI agency for guidance and control systems.

Spain is also allocated an extra 12 million pesetas (£56 million) for extra missile defences in the south, on the Mediterranean coast, and for the towns of Ceuta and Melilla in North Africa.

Japanese Cobra flies

THE FIRST Japanese-manufactured AH-1S Cobra attack helicopter for the Japanese Ground Self Defence Force made its maiden flight on 2 July at the Utsunomiya airfield of Fuji Heavy Industries. The helicopter is the first of 12 ordered in 1983. Testing is to be continued until the end of November and delivery is scheduled for December. The second aircraft, which was rolled out in May, will conduct the weapon system tests on the ground. Six AH-1Ss are to be delivered by the middle of next March.



Spain looks critically at the two-way street to USA

By X I Taibo in Madrid

THE SPANISH GOVERNMENT is considering serious cuts in US weapon purchases after the CASA 212 Aviocar aircraft lost the competition to provide 18 light transports for the US Air Force in Europe. Future contracts with the USA will be carefully taken into account and there will be accompanying requests for "industrial compensations" — the UK-Europe 'two way street'.

One future contract being considered is the upgrading of the Spanish Combat Grande Air Control Alert System which will cost tens of millions of pesetas.

Two helicopter tenders in the near future will also involve US companies. Six heavy transport helicopters are being considered under an 18 000 peseta budget. The Chinook is seen as the firmest candidate: the Spanish Army already has 12.

In July tenders will be sought for a standard army helicopter under a 20 000 million peseta contract. Competitors will be Sikorsky, Agusta and Aérospatiale (Super Puma).

Mr Ronald Lander, US Defense Under Secretary, has been in Madrid to talk to his Spanish equivalent, Senor Eduardo Serra, to discuss future armament and service contracts.

Spain wants a maintenance contract for the US Air Force's F-15s and the navy's F/A-18s in the Mediterranean and warship repairs in Spanish shipyards. The Spanish state-owned Enosa company also wants to produce sights for US M48 tanks.

US officials have shown little interest in maintenance contracts for their aircraft, saying the F/A-18 will not be in the area for three or four years, while the F-15 maintenance contract will be submitted to international competition.

Canada orders CAL 105 mm round

THE CANADIAN GOVERNMENT has placed orders with Canadian Arsenals Ltd (CAL) for the supply of C-76 APFSDS-T (armour piercing fin stabilised discarding sabot-tracer) rounds for the 105 mm gun fitted to the Leopard 1A3 (Canadian designation C1) based in Canada and West Germany.

The C-76 is based on the American General Defense Corporation FP105 round which was successfully tested in Canada and The Netherlands in November 1983.

CAL was responsible for the design of the ignition system of the C-76 as well as cartridge assembly and final packaging.

The FP105 began its development in the late-1970s as a tungsten alloy penetrator version of the American M774 APFSDS-T round which has a depleted uranium penetrator. According to the manufacturer, the current round represents a third generation round in APFSDS-T ammunition and achieves a muzzle velocity of 1485 m/sec when used with the standard Royal Ordnance Factory 105 mm L7 series tank gun. Export customers can also obtain the round using standard US Army propellants.

Pentagon to issue new guidelines on simulator orders

By Hugh Lucas

THE US MILITARY services are planning to procure almost $1000 million worth of training simulators, a new consolidated report shows, but contracting is being slowed down until new Pentagon guidelines are issued in October.

The air force is planning for nearly half the total, which will include two B-1B weapons trainers for $145·7 million and seven F-16 operational flight trainers for $141·5 million. The army is requesting $169·2 million for aircraft and $119.3 million for weapons and tracked vehicle simulators, and the navy is planning $70·7 million for aircraft and $85·6 million for sonar and ship combat system trainers.

The new guidelines, which will be administered by the Defense Training Data Analysis Center, are being drafted at the order of Congress which, in last year's budget hearings, voiced concerns that each service was conducting its own simulator programme and that the overall procurement was becoming disjointed and more expensive than warranted. At the same time, the committees strongly supported use of trainers as a means of reducing operations and maintenance funding.

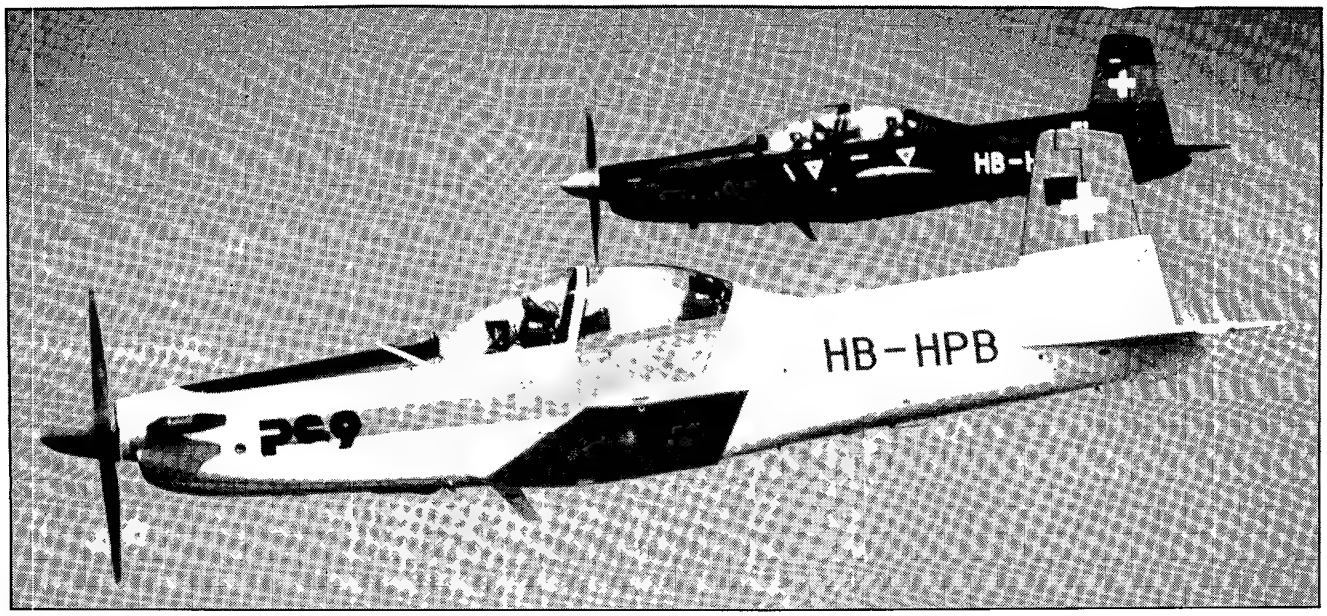
All the programmes are currently fully funded except for the army's AH-64 combat mission simulator which is being bought under a multi-year contract arrangement, as is the air force's F-16 OFT.

Scimitars for RAF EOD

ROYAL AIR FORCE explosive ordnance disposal teams, which are responsible for clearing bombs from attacked airfields, are to receive Scimitar reconnaissance vehicles. They will be used to observe attacked areas and neutralise unexploded bombs with their 30 mm Rarden cannon whose fire will break open the casings and set fire to the internal explosive. HE-T ammunition will be used. The technique has been successfully tested.

In a recent feature (*JDW* 16 June) it was incorrectly stated that the RAF Regiment would be receiving these vehicles, but it is now understood that it is the RAF explosive ordnance disposal teams which will receive them.

◀The new Alvis Ferret 80, which made its first appearance at the British Army Equipment Exhibition this year (JDW 23 June), fitted with the Helio FVT 800 one-man turret which is armed with a 12·7 mm and a 7·62 mm machine gun. The weapons are not fitted in this photograph



▲ *First flight of the second pre-production Pilatus PC-9 turboprop trainer (foreground) flying alongside the first PC-9. Both aircraft are now engaged in the flight test programme*

Second PC-9 flies

AS SCHEDULED a year ago, the second pre-production Pilatus PC-9 has now flown for the first time and is joining the first aircraft on its flight test programme.

The Pilatus PC-9 turboprop is the subject of a joint teaming arrangement between British Aerospace and Pilatus Aircraft of Switzerland. It is one of four contenders which aim to meet the MoD Air Staff Target (AST) 412 requirement to select a new basic trainer for the Royal Air Force.

The Memorandum of Understanding between the two companies, which was signed in March, provided for a manufacturing workshare and, should the PC-9 be selected, for final assembly in the UK by British Aerospace.

Pilatus Chief Test Pilot, Hans Galli, said he was very satisfied with the second aircraft and its systems. This aircraft is almost fully representative of the production version. Electronic flight instrumentation and environmental control systems are installed. The number two PC-9, registration HB-HPB, now joins the very demanding flight test programme, which started when the first pre-production aircraft HB-HPA made its first flight on 7 May.

The first PC-9 has accumulated 75 flights with 90 landings in 55 flight hours. Initial checks show that predicted performance will be achieved. Pilots of four interested air forces have already flown the PC-9.

Plessey bids for US sonar

PLESSEY MARINE is to offer its Cormorant dipping sonar in partnership with the Emerson Electric Calypso acoustic processor for the US Navy's CV inner-zone HELO helicopter project, planned to enter service in the 1990s.

Plessey believes that the Calypso/Cormorant is extremely well suited to the USN requirement for a sonar system which will detect quiet, deep-diving submarines which have penetrated the outer defences of carrier battle groups. If its proposals are accepted, Plessey plans that the sonars will be built under licence by Westinghouse Oceanics, based in Annapolis, Maryland, which will be the sonar systems' integrator for the project.

At least three possible solutions are being offered to meet the navy's helicopter requirement; developments of the SH-06B and SH-2F LAMPS helicopters or a life extension programme for the SH-3 Sea King. Although the final programme may well involve several thousand million dollars and some 175 aircraft, so far only a budget request for $44·5 million for the initial RDT&E (research, development, test and evaluation) for the Sea King up-date has been proposed by the US Navy.

However, the project has recently been given a strong impetus by the navy which issued a 60-day request for proposals (RFP), with a closing date of 19 August. Sikorsky, Kaman and IBM are believed to be the three leading companies which will bid as prime contractors, and Plessey is bidding to all three: the only main rival to the Plessey Cormorant is the Bendix AQS-13F, a development of a system which already equips the SH-3.

The Cormorant is also being evaluated by the British Royal Navy for linking to the Marconi Avionics AQS-902 processor in the Sea King helicopters. Sea trials, involving two RN Wessex helicopters are due to start this autumn.

First F-16C delivery

THE FIRST General Dynamics F-16C, an advanced version of the F-16A Falcon, has been delivered to the US Air Force at the company's Fort Worth Division. It incorporates a number of important system improvements which will enable it to operate effectively in all weather conditions and at night. These will enhance the F-16's combat lethality, survivability and precision navigation capability.

Externally, the F-16C looks the same as the F-16A except for a slightly expanded fin root fairing. Internally, however, there are many differences including the APG-68 radar which offers greater range, resolution and modes of operation than the current APG-66; an advanced cockpit with upfront controls, multi-function displays, a wide-angle head up display and mission data transfer equipment; and increased capacity in electrical power and cooling systems.

The F-16C also features expanded memory, speed and reprogrammability of computers; dual avionics multiplex bus architecture and advanced computer language; and structural changes for increased take-off gross weight, manoeuvring limits and advanced growth.

These basic improvements, some of which will be retrofitted to F-16As now in operational service, will provide compatibility with advanced USAF systems currently under development, including the advanced medium-range AAM (AMRAAM), the low altitude navigation targeting infra-red for night (LANTIRN), the airborne self protection jammer (ASPJ) and the ALR-74 radar warning receiver.

This first F-16C is to remain at Fort Worth until December, when it will be ferried to Luke AFB, Arizona, for test and evaluation.

Hughes to move

McDONNELL DOUGLAS, in a major realignment of facilities at its Hughes Helicopters Inc division which was acquired on 6 January, is to discontinue aircraft production at its current Culver City, California, plant and move to a new facility at Mesa, Arizona.

The move will reduce the current workforce of 5000 at Culver City, the primary production site for the army's AH-64A Apache, to about 1800 employees who will turn out XM-230 chain guns and M242 25 mm cannon for helicopters, the company said recently in Washington.

Calling the move an "expansion", the spokesman said the company anticipates growth from last year's $575 million sales figure to $1000 million by 1985 and to £2000 million by 1990. The latter estimate depends on Hughes' success in obtaining the production contract for the army's new generation LHX in the early-1990s. Hughes will carry out design and development with a team of engineers to be based at Tempe, Arizona, in the next six months. The realignment is to be completed by 1987, officials said.

Hughes has been located in Culver City since the early-1940s and was the site of construction for the huge Spruce Goose flying boat, the largest aircraft ever built and the design of billionaire Howard Hughes. The new Mesa plant also will produce the 500E executive helicopter, officials reported.

The current workforce at the California and Arizona locations is projected to rise from 6200 now to 9000 by the end of the decade.

Detail parts production

FAIRCHILD INDUSTRIES' Precision Fabrication Center, built to produce detail metal components by high technology methods, was dedicated at Columbus, Ohio, last month, although it has actually been in production since last January. It produces detail parts for Fairchild aircraft, certain commercial/industrial products and for other customers, more cost-effectively and with improved quality than was possible before.

The company believes it is benefiting from the consolidation of detail parts production at a single factory equipped with the latest technology. The latest fabrication methods have been integrated with automatic material handling and storage and both these functions have joined with computerised information and process control.

Material costs are said to have been reduced by up to 40% and production lead time by as much as 60%. At the same time quality has improved.

RPV engine runs

THE PTAE-7, a small gas turbine engine designed by Hindustan Aircraft Ltd (HAL) and intended for a remotely piloted vehicle, has run successfully in Bangalore, India, for the first time. The demonstration was witnessed by senior HAL management. HAL collaborated closely with Dowty & Smiths Industries Controls Ltd (DSIC) in the design and development of the digital fuel control system for the aircraft, which was also successfully proved during the test run.

An agreement was signed in 1981 by HAL and DSIC to develop the fuel control system for the PTAE-7. It comprises a fuel pump, metering valves, electronics and alternator, all of which were specially designed and manufactured to ensure that the whole system would fit into the nose cone of the engine. It is anticipated that the success of the project will lead to substantial production orders.

Gripen engine qualification in 1987

THE GENERAL ELECTRIC F404/RM12 augmented turbofan engine which will power the JAS39 Gripen, the Swedish fighter attack and reconnaissance aircraft, is scheduled for production qualification at the end of 1987 after it has completed 3000 hours of testing. *JDW* (28 July) reported it had met all requirements in early tests. The 80 kN thrust F404/RM12 is a derivative of the F404 GE400 which powers the US Navy F/A-18.

IN BRIEF . . .

CROSS DUCT PROPULSION FOR V/STOL: A new generation of US Navy V/STOL aircraft is being studied by the Lockheed-California Company employing a split-fan, cross ducting propulsion system which allows for hover control and transition between vertical and horizontal flight. The twin engines would be connected by a cross duct which can deflect engine exhaust flow downwards through two nozzles located in each nacelle. Control is provided by varying the nozzle area. Fan air is transferred fore and aft or across the aircraft for pitch or roll control.

ARDCO BUILDS JVX TEST BLADES: Three 0·658 scale rotor blades have been built by the Advance Ratio Design Company (ARDCO) and have already demonstrated a substantial payload margin for the US Joint Services Advanced Vertical Lift (JVX) aircraft. The blades are undergoing 'critical path' tests at the NASA/Ames facility in California. Rotor technology is important for the JVX programme because shipboard operations limit rotor diameter to 11·6 m.

MARITIME PATROL BANDEIRANTE HOURS: The Brazilian Air Force squadron of Bandeirante maritime patrol aircraft, based at Salvador, has recently amassed 20 000 flying hours with its aircraft without accident. The Bandeirante replaced the Lockheed Neptune six years ago. Designated P-95, the Bandeirante is fitted with search, rescue and weather avoidance radar, a searchlight and other special equipment. Endurance is better than nine hours.

ACCESSORY GEARBOX FOR ACX: The Aeronautical Equipment Division of Hispano-Suiza has been selected to supply relay accessory gearboxes and power transmission shafts for the ACX aircraft. There are two complete assemblies per aircraft, each of the two engines transmitting through the power transmission shaft the power required to drive the relay accessory gearbox equipped with two hydraulic pumps, an alternator and the air starter.

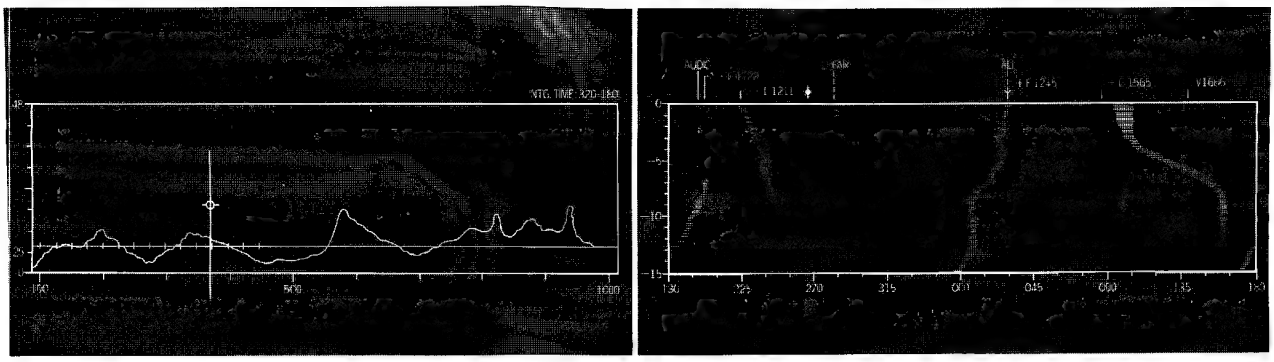
FIRING TRIALS OF MATRA MISTRAL: During the past year Matra has fired 12 Mistral ground-to-air missiles in a test programme just completed at CEM, the French Mediterranean Testing Centre; four of these had homing heads. The target represented a stationary helicopter at low altitude. These trials will be followed by firings at a CT20 target aircraft. The Mistral is due to go into production at the end of 1986.

CURING FOR COMPOSITES: McDonnell Douglas is designing new methods to automate the curing process for making aircraft parts out of composite materials, as the initial step in a $2·95 million US Air Force contract. The company is building composite parts for three major combat aircraft: F-15 Eagle, F/A-18 Hornet and AV-8B Harrier II. The computer-aided curing process covers four years in three phases.

TIGER MOTH FOR MUSEUM OF ARMY FLYING: Sir Raymond Lygo, Managing Director of British Aerospace, recently presented a de Havilland Tiger Moth biplane trainer and £1500 for its upkeep, to the Museum of Army Flying at Middle Wallop, Wiltshire. The Tiger Moth, formerly owned by Lotus Group Deputy Chairman Alan Curtis, was used during the Second World War to train glider pilots.

SERVICES SYMPOSIUM PLANNED: 'The services which the Civil Aviation Industry can provide to increase the cost effectiveness of military forces' is the somewhat lengthy title of a symposium being arranged by CSE Aviation at the Royal Air Force Club in London on 30/31 August. Free to invited delegates from government bodies and armed forces, the symposium will be particularly interesting to those engaged in training, engineering and administration. Further information from Mr Peter Latham, Principal, Oxford Air Training School, Oxford Airport, Kidlington, Oxford OX5 1RA.

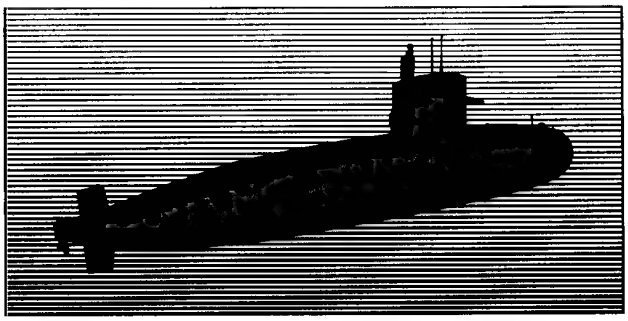
HOW WE MAKE THE SUB-MARINER'S DREAM COME TRUE



A submarine fitted with one complete system combining all the sensor, data handling, fire control and communication functions, and even platform and machinery control, if desired.

That is the submariner's dream. Such a system would finally give him the flexibility, reaction speed and technological headstart necessary to keep the edge on any adversary.

We have always been aware of this and have started to think in terms of integrated systems from the very beginning. Signaal's M8, SINBADS, GIPSY and SIASS all attest to this approach. Now that all these



integrated systems have been incorporated in the highly innovative Submarine Sewaco System, the submariner's dream has come true. And what's more, we are not talking about a paper tiger: Submarine Sewaco is there and operational.

Sewaco's striking feature is its universal, multipurpose operator consoles performing any combination of functions such as command display, contact evaluation plotting, sensor and weapon control. Even a few of these consoles offer complete system reconfiguration capability and therefore optimised redundancy.

On top of that, Submarine Sewaco cuts back the manning requirement for the operational team from twelve to four men. We don't have to tell a submariner what that means.

As in so many other cases, systems integration proved to be the answer, realizing the submariner's dream. Once again it was Signaal who came up with the answer.

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S5E

BRIEFING

NATO Channel force faces covert Soviet mine threat

By Mark Daly

NATO'S MINE COUNTERMEASURES 'fire brigade' is the Standing Naval Force Channel (STANAVFORCHAN), a squadron of five to ten vessels from NATO nations with a specific interest in the English Channel. Intended to protect shipping lanes in shallow waters around western Europe, its usual hunting grounds are the Channel and southerly areas of the North Sea.

Last month STANAVFORCHAN was assigned to HIGHLAND FLING, a British annual mine warfare exercise held in the Irish Sea. The presence of a NATO force this year underlined the worrying threat of mine warfare in waters that control the gateways to Faslane and Holy Loch, homes of the British and US ballistic missile submarines.

In time of war, the main resupply routes from the USA to Europe would also depend on that same crucial strip of sea. For any aggressor brave enough to attempt offensive mine warfare in the Irish Sea, the rewards are clearly immense, but NATO thinks it could inflict a punishing attrition rate. The Soviet Union can deploy mines from aircraft, for instance, but the Bear or Badger minelayer would first need to penetrate UK defences.

Minelaying from surface warships is also ruled out, but the threat of mines sown covertly by merchant ships or by submarines remains serious.

Modern technology ensures that the mine remains a powerful weapon, with some special features giving it a unique tactical dimension, such as the ability to 'count' passing ships.

"The first 'shot' of the next war could be a mine laid in the approaches to the Clyde by submarine, days before the declaration of hostilities", said Cdr Richard Moore, the Commander of STANAVFORCHAN, on board the headquarters ship HMS *Abdiel*.

The force consists of HMS *Cottesmore*, HNIMS *Abcoude* and HNIMS *Naaldwijk* from The Netherlands, West Germany's FGS *Tübingen*, and Belgium's BNS *De Brouwer*. *Cottesmore* is a dual role ship capable of minesweeping and minehunting, the two Netherlands' vessels are sweepers while both the *De Brouwer* and *Tübingen* are hunters.

The force can, if required, form the basis of a more powerful MCM force, as was demonstrated on exercise BLUE HARRIER '84, which was held in the Baltic earlier this year.

HIGHLAND FLING is designed to be as realistic as possible, so few mines are laid, making the hunters' task particularly difficult. STANAVFORCHAN discovered two mined areas off Liverpool bay during 432 nm of steaming from North Minch, between Shetland and the Scottish mainland, down to Angelsey off north Wales. After the force located the mines, some of which had been laid by RAF Hercules, there remained the awkward and time-consuming task of recovering them — in wartime the mines would, of course, be exploded.

"One sub might lay between four and 20 mines", said an operations officer on board the headquarters ship. "The Soviet Union particularly favours rising mines, although a threat is posed by all types: moored, ground and now self-propelled. Some Soviet contact mines date back to 1926 — and you don't have to have a modern mine to cause trouble."

The NATO ships are currently sweeping to a depth of 110 m; the advantages of laying mines in deeper waters are slight, NATO officers say, and in the future MCM operations deeper than 200 m seem unlikely. Several of the STANAVFORCHAN ships are particularly old; *De Brouwer*, *Abcoude* and *Naaldwijk* all date from the mid-1950s. But the new tripartite class is entering service with Belgium and The Netherlands in increasing numbers, and Britain's particularly capable *Hunt* class now numbers six, with nine more ships to be built.

However, it is equipment rather than hulls that still give some cause for concern. As one NATO officer told *JDW*: "We need secure speech communications; some improved form of anti-aircraft protection; and in many cases, variable depth sonar".

Of the five ships, only *De Brouwer* has variable depth sonar, a relatively old but capable Sperry AN/SQQ-14, which can cope with deep water and which greatly improves identification of targets when compared to the Type 193M fitted to the *Hunt* class.

For anti-aircraft protection chaff dispensers linked to ESM equipment are essential, say NATO officers, together with some form of shoulder-launched missile. MCMVs are not rated as prime targets for air-launched missiles, but an enemy strike aircraft returning with unused missiles would certainly take advantage of such a "target of opportunity".

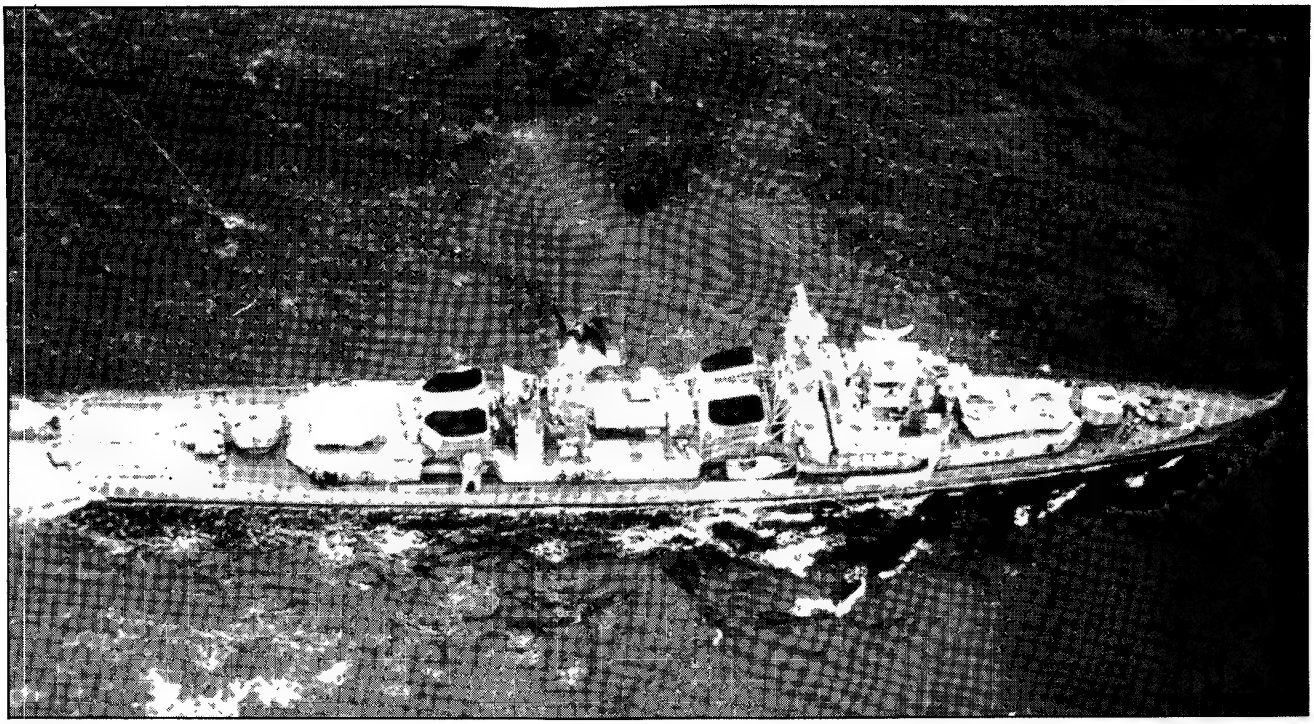
Despite these and other equipment criticisms (*JDW* 30 June), NATO claims that it is "one of the most effective MCM forces in the world". It is certainly one of the more successful examples of NATO co-operation and interoperability.

Since it was formed in 1973, the force has been commanded by three Belgian officers, three British, two Dutch and one West German. It has taken part in 85 exercises, some, like HIGHLAND FLING, national, while others have been NATO or multi-national exercises.

The force is under the command of the Allied Commander-in-Chief Channel (CINCHAN), Sir William Staveley, based at Northwood, England.

Although no Danish vessels took part in HIGHLAND FLING, the Danish Navy is a regular contributor to the force, having supplied six vessels over the years. Five US ships and one MCMV from Norway have also served with the force. All ships serve for at least six months before returning to their own national fleets. *Cottesmore*, for instance, is scheduled to depart after summer leave; she will be replaced by *Cattistock*. The first of the Netherlands' advanced tripartite class minehunters is expected to join STANAVFORCHAN in 1985-6.

▼ *The Firth of Clyde, last month.* Cottesmore, Naaldwijk, Tübingen *and* Abcoude *off the Ayrshire coast. Together these ships form part of NATO's Standing Naval Force Channel* (Mark Daly)



New view of Provorny trials ship

▲ AN OVERHEAD VIEW of the Soviet 'Kashin' class destroyer *Provorny* (see Soviet Intelligence, 9 June).

The single SA-N-7 launcher is mounted on a raised platform on the after deckhouse, just abaft the second pair of gas turbine uptakes.

Forward of the bridge can be seen the paired base plates which may be for the installation of further SA-N-7 launchers. Note the enlarged bridge structure which now carries a Head Net-C V-beam air surveillance radar.

The Top Steer 3-D tracking radar is on top of a new enclosed mast abaft the torpedo tubes. Front Dome illuminators for the missile system are visible on platforms projecting from the forward end of the bridge, from the sides of the two masts, and from the sides of the after uptakes. The twin 76 mm gun mountings and the RBU 1000 and RBU 6000 anti-submarine rocket-launchers have been retained, as have the helicopter markings on the stern.

Provorny, recently transferred from the Black Sea to the Northern Fleet, was built by the 61 Kommuna Shipyard at Nikolaiev, on the Black Sea. In the mid-1970s, she was decommissioned for conversion to a trials ship for the SA-N-7 missile system.

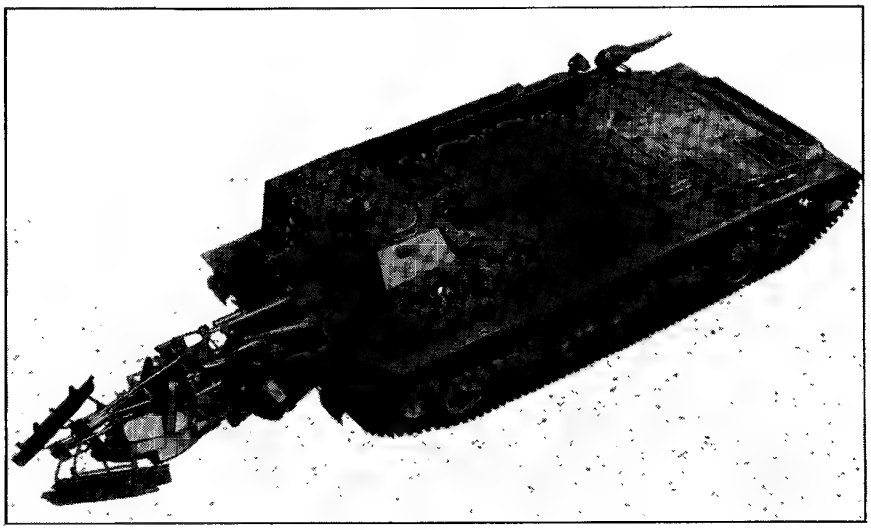
GMZ tracked minelayer

THE GMZ (Gusenichi Mino-Zagraditel) is issued on a scale of three for each tank or motorised rifle engineering company and has now largely replaced the earlier PMR-3 towed minelayers.

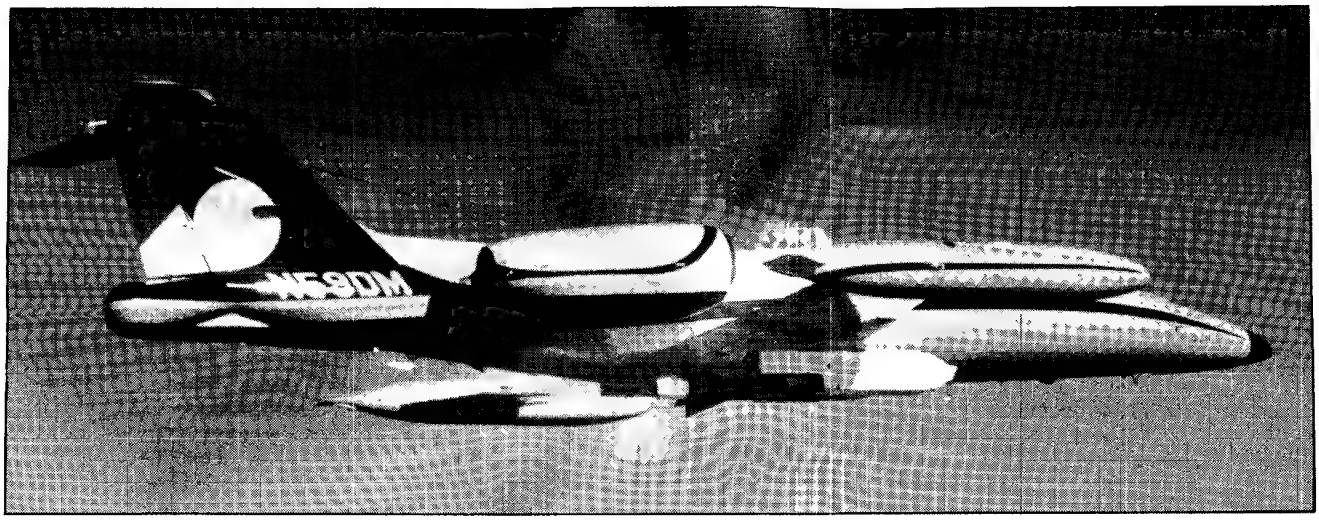
The GMZ tows a minelaying plough equipment similar in appearance to the PMR-3 but apparently capable of operating at higher speeds and burying mines at increased depths. The tracked chassis of the GMZ is based on that of the SA-4 (Ganef) surface-to-air missile system and is entirely enclosed, allowing the loading crew to operate the minelaying plough under top protection.

The mines are loaded into the plough from a chute that extends into the vehicle interior and the mines can be either buried or simply placed on the ground surface. The GMZ has a basic crew of four although more men can be carried.

Four mines can be buried every minute 4 to 5·5 m apart. It is estimated that it can carry 208 anti-tank mines of the TM-46, TMN-46, TM-57 or TM-62 type. Reload time for the vehicle is 12-15 minutes.



▲ *Model of GMZ tracked minelayer with minelaying plough in position*



▲ *A Learjet fitted with the MTR-101 target launch and recovery reel, a lightweight unit which can be fitted to many different types of aircraft*

'Privatised' target towing

By Brian Walters

DRAMATIC INCREASES in defence costs have made it increasingly difficult to achieve desired standards of training, particularly when such training involves the use of expensive equipment. Yet, with the lessons of the Falklands (Malvinas) conflict still fresh in many minds, it is clear that it would be folly to cut down on certain aspects of training.

The Royal Navy, for example, must ensure that gunners, missile operators and fighter pilots are kept at the peak of their air defence skills. Anti-ship missiles are very expensive and therefore can be used only occasionally for training purposes — quite apart from the fact that it is too hazardous to launch such a weapon against a manned vessel (even without a warhead).

Simulation can play a part in weapons training, but there is really no substitute for 'hands on' training, and it is therefore necessary to provide targets for the safe instruction of weapons operators.

Faced with the need to cut costs without cutting training standards, there is a growing move towards using civilian companies to provide services which result in real savings. The concept is not new; many service helicopter pilots received their *ab initio* training from civilian instructors, and some obsolescent aircraft, such as the Canberra and Hunter, are flown by civilian crews to provide training for radar operators and others.

However, outdated military aircraft are expensive to operate and several forces have turned to civil operators to provide target towing facilities using civil aircraft. Sweden and West Germany have made use of this type of service for some years but there is strong evidence that others will soon join them. Indeed the Royal Navy is showing interest in such a service and is believed to be near to signing a contract for target towing services.

Advances in the design of towed target systems make it easier for civilian operators to provide a service to the high standards demanded. Sleeve targets are of limited value for example, and if adequate simulation is to be provided, it is necessary to use darts of various kinds.

Aware of the growing market opportunities, CSE Aviation has been working closely with Hayes International Corp and the Marquardt Company to ensure that it is in a position to respond to the demands of the services. As the UK distributor for Gates Learjet, CSE handles an aircraft with a proven record in 'special mission' roles in various parts of the world — a fact which has doubtless helped in obtaining CAA clearance for the Learjet to be used in the target towing role.

Northern Executive Aviation has a Learjet converted for target towing ready to respond to expected demands for this type of service. The aircraft will be flown at Farnborough to demonstrate its capability to delegates from many countries.

The latest target systems are lightweight, simple to operate and can be fitted to executive jet aircraft without compromising their ability to carry passengers. This is where the benefits of 'privatising' target towing become most evident; it is not necessary to dedicate an aircraft solely to the task. A suitably modified Learjet can be used to fly executives in a cabin which does not have to be altered so that military users need only charter the aircraft when an exercise is planned.

The Learjet is very much cheaper to operate than a Canberra so the opportunities of real savings by using a civilian operator as and when required are very attractive.

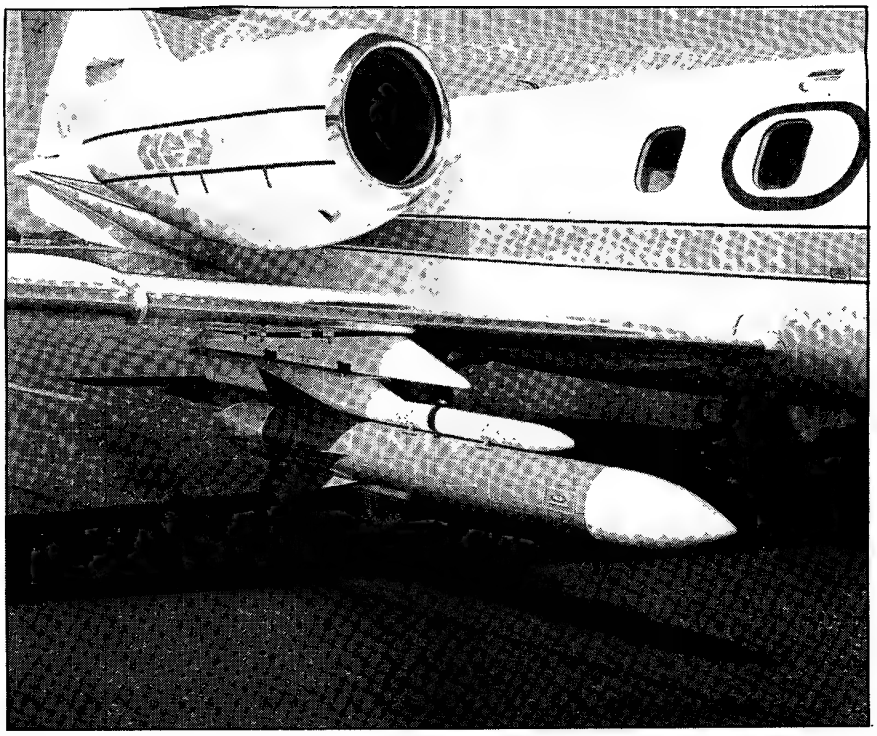
The Royal Navy or any other service would not be pioneering the use of the Learjet for this particular task. The US Navy can call on a fleet of seven Learjets to provide radar training and target towing services and over a two year period these aircraft have demonstrated a 99·2% mission reliability. This is an impressive record and one which is especially important to a service which must commit many ships, aircraft and personnel during a training exercise.

Some forces operate Learjets on surveillance, mapping, ELINT and other duties, and many of the 1200 plus Learjets currently in service are flying with military units.

The fact that the Learjet has its origins in a military design (the Swiss P-16 fighter) has eased the task of adapting it to carry underwing stores. The Learjet has an eight-spar wing similar to that of the P-16, allowing for the installation of two Alkan 165B ejector release units which have been cleared for carrying stores weighing up to 450 kg per side.

A number of towing systems can be used with the Learjet, including the Hayes Universal Tow Target System (HUTTS) and the MTR-101, recently developed by Marquardt.

A subsidiary of the ISC Group, Marquardt has considerable experience in the production of reeling machines for target systems, while Hayes is the largest manufacturer of aerial targets in the world.



►*The very compact and streamlined LTC-2 launcher is clearly shown in this view of a unit fitted to a Learjet*

CSE is actively marketing the Learjet for the target towing role and is working with both companies so that it can match the target to the particular needs of the customer.

The MTR-101 reeling machine is claimed to be the only one suitable for use on civil aircraft, but its compact design and light weight also suit it for use on a variety of military aircraft, almost any type being suitable. The BAe Hawk is currently being adapted to carry the MTR-101 and it is expected to be proved and cleared before the Farnborough Air Show. A number of existing Hawk operators have expressed interest in the installation and there are strong indications of a Middle East order in the near future.

Designed specifically for the aerial gunnery target mission, the MTR-101 can be used at tow airspeeds of up to Mach 1·3 at 10 000 ft, and provision is made for automatic target launch and recovery to preset cable lengths. The reel machine uses ram air turbine power although the design features a small frontal area for minimum drag.

HUTTS has been developed to meet the need for an aerial target towing system which can be fitted to most aircraft without modification. Its other design feature is the elimination of complex reeling mechanisms, making for substantial savings in expensive maintenance and support equipment. However, this does mean that the targets are normally discarded at the end of each firing session.

The target launcher designed for HUTTS carries the target in flight and launches it for tow, releasing the towline when the mission is completed. The HUTTS series includes five different towed target models, all of which use the common launcher, and which are made of impact resistant thermoplastic or reinforced plastic. Arrangements are being made for the body and some other components to be manufactured in Britain, leaving the target scoring and other items to be supplied by Hayes.

Real time scoring can be included in all models, the variants including augmentation in the form of radar reflector and lenses, IR and plume, which simulates full afterburner, smoke and light. The two reel assembly is mounted in the targets, near the centre of gravity to ensure stability during flight.

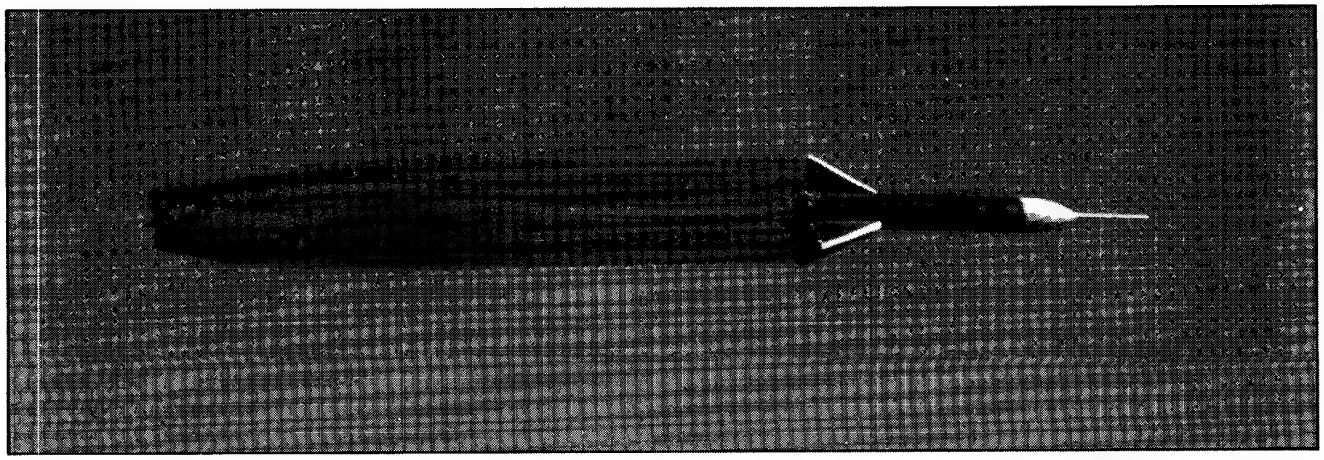
Hayes will be adding to the HUTTS range by introducing a sea skimmer target later this year. This will doubtless add to the appeal of the system to navies; the Brazilian Air Force already uses the system in support of the navy, towing HUTTS targets from Xavante aircraft, while the Italian Navy is impressed by the system currently used by the US Navy at Naples.

Yugoslavia was an early customer for the HUTTS, towing the targets from MiG-21 fighters and reported to be very pleased with the system. The system is also in use in Australia where Learjets operated by Stillwell Aviation tow targets for all three services and occasionally for the US and New Zealand navies.

The HUTTS is therefore a well proven system (although relatively new in concept) which requires minimal airborne and ground support. The reduction in logistics and maintenance costs is said to more than off-set the use of a 'mission consumable' target and there can be no doubting the awakening interest in the system.

It must be emphasised that CSE's interest in promoting the Learjet for target towing did not arise from the Defence Minister's last White Paper; the company began work on the programme some two years ago. There is evidence that its efforts will not go unrewarded and the coming months should see some contracts signed. To help achieve this aim, a modified Learjet will embark on a sales demonstration tour after the SBAC show, following up presentations already made to the air forces of such countries as Belgium, Denmark and Norway.

CSE is promoting the system throughout Western Europe, much of anglophone Africa and the Gulf. Interest in the Middle East is said to be strong and it seems that the lessons of the Falklands war have been taken into account by many nations. ■■■



▼*The TGT version of the HUTTS series uses polypropylene fibre streamers to absorb cannon fire*

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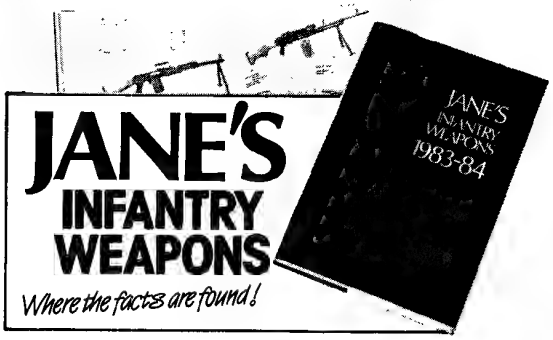

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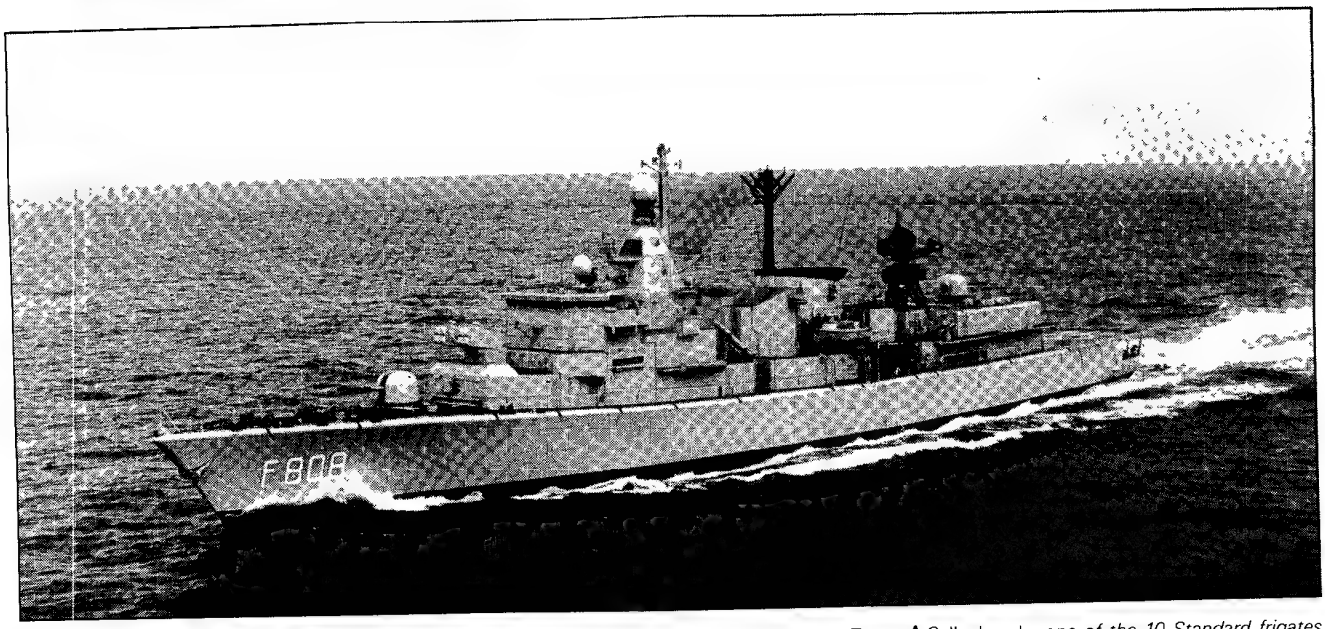


▲ Callenburgh, *one of the 10 Standard frigates (Kortenaer class) which joined the Royal Netherlands Navy. Two more were sold to Greece*

Long-term defence of The Netherlands

By Capt F de Blocq van Kuffeler, RNIN (Retd)

"TO CONTRIBUTE to preventing war and promoting peace, and to be prepared and able to defend the freedom and independence of our country and its people is, above all, the guideline in maintaining a strong Netherlands' defence." These are the opening words on the first of 231 pages of the *Netherlands 1984-1993 Ten Year Defence Plan*. The remainder contains information on how the government proposes the defence be organised in that period.

Defence plans 1974 and 1984

The 1984 defence plan builds on the foundations of its 1974 predecessor. When the earlier plan was drafted, the armed forces of The Netherlands were still largely organised, equipped and trained according to immediate post-war doctrines. A thorough modernisation, reorganisation and re-equipment was obviously overdue. The 1974 defence plan therefore produced a major shake-up in modernising organisation, doctrines and tactics. It also mentioned that much of the equipment was obsolescent and that a considerable programme of new construction and replacement was urgently needed.

Much was done in the intervening 10 years. Regular examinations in the light of the latest ideas and developments were carried out and modifications made, as necessary. The reorganisation also resulted in much larger sums of money becoming available for equipment purchases. The present 1984 defence plan does not, therefore, bring as major a change as the previous one. Outside the *matériel* sector only limited modernisation and improvement was necessary, although the acquisition of modern equipment had not yet been completed. The 1984 defence plan provides a useful review of the current state of the forces and details how the sums expected to be available for new investment should, in its view, be spent. The final word is, of course, with parliament.

Political base

After reviewing the existing world-wide political situation, the government decided that only one conclusion was possible: room for a major relaxation of tension in East-West relations is still very small. The situation in Europe is still characterised by a fundamental controversy between two social systems. The system which is enforced on the East European neighbours of the Soviet Union continues to be a threat to stability and, therefore, to peace in Europe.

Because The Netherlands is a comparatively small part of a world in which two superpowers are major factors, the defence effort in The Netherlands can be effective only if it is combined with that of other nations. The government therefore considers membership of the North Atlantic Treaty Organisation essential for the security of the country. There is no doubt that there is widespread support for this among the great majority of the population, despite a noisy small minority with different views.

The government approves the development within NATO, in which the relations between the USA and the European partners have become more and more equal, particularly in the economic field. It is hoped that in future this will also extend to the defence field. The government also looks forward to greater European co-operation. This should be of high priority in the political field, particularly where it touches the security of the Western world. There should also be more co-operation in the defence field, particularly in combined production of equipment, which can lead to considerable economical benefits.

Nuclear policy

The Netherlands is not a nuclear power and does not develop or produce nuclear weapons. It has signed the Non-Proliferation Treaty against proliferation of nuclear weapons. This does not, however, mean that its armed forces are excluded from employing nuclear weapons, which other countries may, under certain very special wartime circumstances make available. Moreover, it may be necessary to allow forces of other friendly countries, which are based in The Netherlands, to store such weapons and use them in certain emergencies. In June, the government narrowly won a parliamentary vote on cruise missile deployment. It is the government's plan to delay its decision on acceptance of the missiles until November 1985. If the Soviet Union agrees to limit SS20 deployment to its present level, The Netherlands will automatically refuse cruise. Siting of the missiles will in any case be delayed until 1988 — considerably behind the NATO schedule.

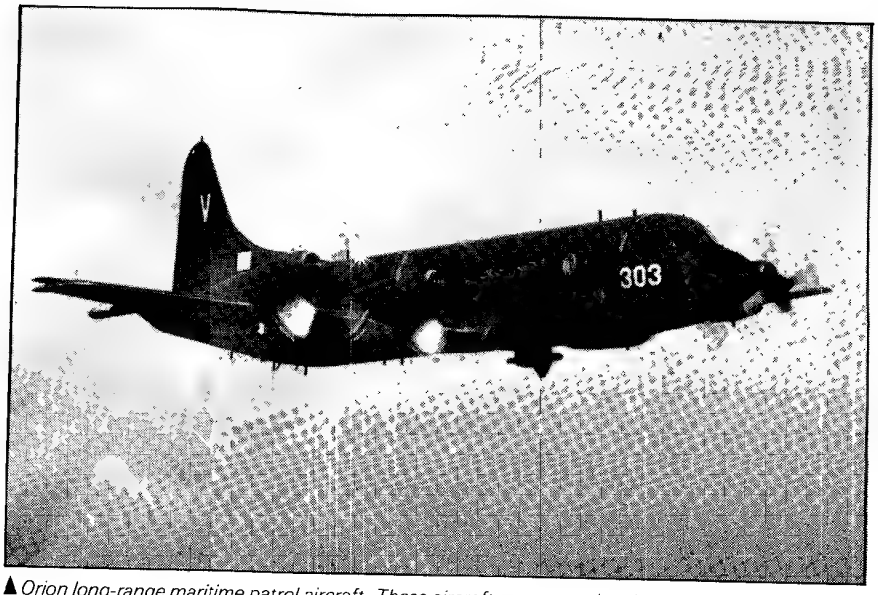
The nuclear question is a very emotional one in The Netherlands. This is partly caused by a deeply inborn hankering for peace, but also by a strong feeling of respect for freedom. There is no love, at all, for Soviet communism, but many people believe that no one has the right to stop the USSR being communist if that is what it wants. To many idealists this feeling is almost religiously strong, resulting in a refusal to believe that anybody would ever want to interfere with how they, the Dutch, live. To these people nuclear weapons are completely unacceptable. These weapons, if used, would not convince people that they must change their attitude but instead that they must destroy them.

Strong opposition to nuclear weapons is influenced by the density of the population. The Netherlands is one of the most densely populated countries in the world and certainly in the West.

What these people forget is that having no nuclear weapons stored and fired from one's territory, does not mean that the enemy does not use such weapons against them. It takes only one small step further to add the argument of nuclear blackmail by a nuclear power against a non-nuclear one.

The government publishes pages and pages explaining its views on the nuclear question. There is only room here to mention a few of the sound arguments on why The Netherlands cannot do without the possibility of wartime use. Armaments are not the cause of tension or conflict, but are caused by them. Increases in international tension and conflict are caused by people and communities hiding behind armaments. It is a dangerous illusion to think that peace would be assured if nuclear weapons were removed, because the truth is that nuclear weapons, by their nature of mass destruction, make victory in an all-out conflict impossible. If they disappeared, the danger of war in Western Europe would become much greater.

Whether nuclear weapons are 'good' or 'bad' is not a question which can be considered free from the reality of the present day world. One has got to take into account the fact that nuclear weapons are in existence and cannot be removed; they are by no means weapons of mass destruction only, they prevent war by acting as a deterrent; and there are no practical alternatives to the present strategy of such a deterrent.



▲ *Orion long-range maritime patrol aircraft. These aircraft are manned and owned by the Netherlands Fleet Air Arm and not by the air force as in Britain*

The government further points at the removal, from Europe, in recent years of first 1000 and then 1400 nuclear charges, thus proving that NATO is not arming for armaments' sake, but is carefully considering the situation.

Arms control

Arms control, arms limitation and arms reduction are inseparable parts of the Netherlands' defence policy. It is a question on which the Foreign Office and the Ministry of Defence are co-operating closely. The basic principle is that no weapons system should be excluded from the negotiations. Reduction of armaments is possible and should be carried out, but it should be done in a responsible way, not at the expense of deterrence, nor in such a way that endangers international security and thereby threatens international political stability. Some progress is being made in this field, but much more ought to be achieved to remove distrust, and increase a mutual feeling of security.

Peace operations, United Nations

The Netherlands Government feels that peace operations under the auspices of the United Nations can, in many cases, assist the return to normal relations and situations of peace. It is therefore intended to continue keeping a number of units from all three branches of the armed forces available, at fairly short notice, for such operations. In fact, their efficiency and equipment will be improved. At present The Netherlands takes part in UNIFIL (UNO Forces in southern Lebanon), MFO (peacekeeping in Sinai) and UNTSO (observer force in the Middle East). Since the defence plan was published, The Netherlands Government has stated that if it was intended to form a UNO peacekeeping force in Beirut in Lebanon and The Netherlands was asked to participate, the government would do its utmost to make the requested forces available.

Table 1

Financial plan of Netherlands Defence 1984-93
(million guilders)

	1984	*1985*	*1986*	*1987*	*1988*	*1984-8*	*1989-93*
Pay and allowances uniformed and civilian	6064	6085	6091	6108	6120	30 468	31 222
Pensions and allowances retired personnel	1339	1367	1397	1427	1457	6987	7285
Running costs, equipment	1780	1779	1773	1779	1834	8945	9612
Total running costs	9183	9231	9261	9314	9411	46 400	48 119
Investment infrastructure	543	584	562	584	638	2911	3693
Investment equipment	3331	3495	3751	3917	4148	18 642	24 835
Total investment costs	3874	4079	4313	4501	4786	21 553	28 528
Basic defence estimates	13 057	13 310	13 574	13 815	14 197	67 953	76 647
Correction	−18	−17	−16	−15	−13	−79	−40
Final defence estimates	13 039	13 293	13 558	13 800	14 184	67 874	76 607

Finances

A detailed financial plan has been drawn up in conjunction with the Ministry of Finance. Compared with 1983, there will, in the years up to 1986, be an annual increase of 2% in the true value of expenditure. This is less than the NATO request of 3%, but the economic depression has made this inevitable. As the situation is improving it is planned that, after 1986 and up to 1993, there will be a yearly increase of 3%. This gives a total of defence estimates for 1984 of 13 000 million guilders (£1 is about 4·4 guilders). By 1988, this will have increased to 14 000 million guilders at present day prices.

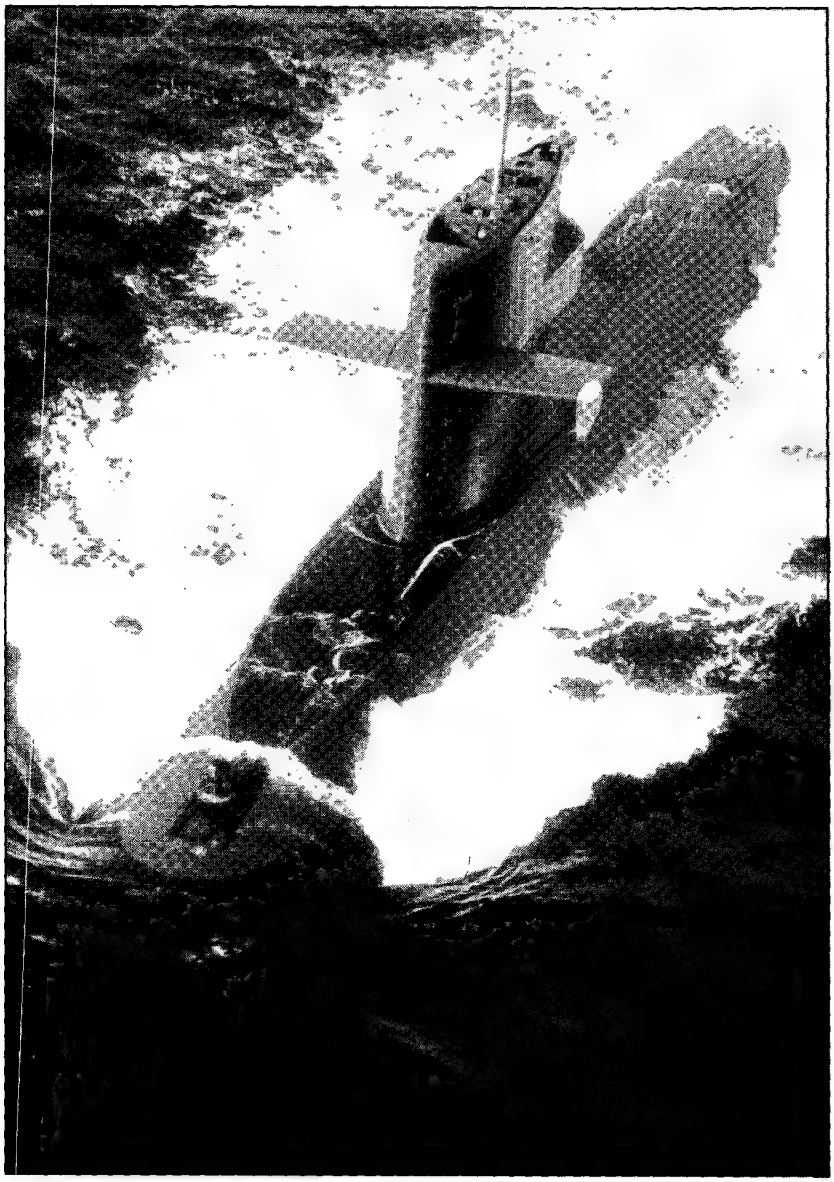
There are two important clauses. It has been agreed that each year the defence estimates, in fact the amount of money available for defence, will be adjusted for 'wage and price movements', and financial inflation. The other clause concerns equipment orders placed in The Netherlands to promote employment in the country, when it would have been cheaper to place the order abroad. The government considers that if this is done some defence finances do not really contribute to strengthening the defence of the country. Therefore arrangements will be made so that at least most of the extra costs will be met from sources other than the defence estimates.

Table 4

Equipment expenses Royal Netherlands Navy 1984-93
(million guilders)

	1984-8	*1989-93*
'S' frigates	413	–
'M' frigates	1310	1530
Walrus submarines batch 1	354	-
Walrus submarines batch 2	545	185
Walrus submarines batch 3	–	540
MCM vessels	650	416
Other ships	67	160
Modernisation and MLM	268	392
LRMP aircraft	273	?
Helicopters	67	440
Infrastructure	310	560
Munitions	522	1167
Goalkeeper CIWS	408	124
Spare parts	167	155
Other expenses	349	1025
TOTAL	5703	6694

All figures at 1982 prices, corrections will be made for inflation



▲*The submarine* Zwaardvis. *The new* Walrus *class will look identical above water, but will have major improvements in equipment*

From 1984-93 the total pattern of defence expenditure will show 35% for equipment investments; 42% for active service personnel pay and allowances (including civilians); 13% for equipment running costs; and 10% for pensions and other retirement expenses. Regarding finances for the branches of the armed forces, the following division has been agreed: navy 20%; army 41%; air force 20%; military police 2%; and 17% for general expenses such as pensions, NATO infrastructure and scientific research and development.

There is one final point which mainly concerns the navy: the bankruptcy of Rhine-Scheldt-Verolme Holding Company which owned most of the shipyards where naval ships were normally built. The government has decided to save and assist the Royal Schedlt Co and the Rotterdam Drydock Co. This means that a number of shipbuilding orders which were originally planned for 1986 had to be placed at once. It also meant that 490 million guilders which had been paid, but not yet used by the yards, was lost and would have to be paid again. The total of the difficulties amounted to 1340 million guilders (about £305 million). It was possible to add some amounts to the defence estimates to compensate, but the rest will have to be borne by those estimates.

Personnel

With the current plan, there will be no major changes in total numbers (see Table 2) in peacetime. In the last few years considerable reductions were carried out and it is considered that minimum strength for a viable peacetime organisation has now

Table 2
Planned personnel strength of Netherlands forces — peacetime

	1984	*1988*	*1993*
Royal Netherlands Navy			
Professional	15 430	15 819	15 819
National service	1437	1320	1320
Total uniformed	16 867	17 139	17 139
Civilian	6445	6490	6490
TOTAL	23 312	23 629	23 629
Royal Netherlands Army			
Professional	23 879	23 769	24 079
National service	40 785	40 465	40 905
Total uniformed	64 664	64 234	64 984
Civilian	12 907	12 977	13 157
TOTAL	77 571	77 211	78 141
Royal Netherlands Air Force			
Professional	13 245	13 020	13 480
National service	3565	3465	3565
Total uniformed	16 810	16 485	17 045
Civilians	2910	2915	3005
TOTAL	19 720	19 400	20 050
Other (Mindef, Military Police, etc)			
Professional	4345	4350	4330
National service	581	506	506
Total uniformed	4926	4856	4836
Civilians	4980	5010	5010
TOTAL	9906	9866	9846
Total Netherlands defence			
Professional	56 899	56 958	57 708
National service	46 368	45 756	46 296
Total uniformed	103 267	102 714	104 004
Civilians	27 242	27 392	27 662
TOTAL	130 509	130 106	131 666

been achieved. At present peacetime levels the navy and air force are already quite close to planned wartime strength but the army will have to mobilise considerable numbers.

National service is an integral part of The Netherlands' defence organisation. There is no doubt that recruitment in peacetime would not provide the numbers needed for wartime strength. It must not be forgotten that The Netherlands has, in peacetime, a higher percentage of men under arms than Western countries with professional forces only. There is no general strong feeling against national service in the country and the government is investigating the possibility of varying the length of service depending on training in civilian life. The question of increasing pay to national servicemen has been investigated although The Netherlands already pays its part-time personnel more than any other country, except Denmark. It is felt, therefore, that these pay increases must receive a lower priority than other very urgent projects.

The government has made long-term studies of future acquisition of personnel, both recruitment of professionals and call-up of national servicemen which cause no problems at present. In about 1990, the number of men reaching service age will begin to decrease. All indications are, however, that there will still be enough manpower to fill both categories, but it might not be possible to get sufficient people with the required pre-service training. The possibility of extending

▲ Buyskes, *one of two smaller survey ships, comparable with the British* Bulldog *class*

training in service establishments is being investigated.

The government policy of equality for women will also be applied as far as possible to the armed forces. In principle, it is the intention that all positions will be open to women with the right training and experience, as they are for men. The navy now has a group of female personnel on board two naval manned fleet supply ships, though this is still on an experimental basis. Both the army and the air force have opened many job opportunities for women which did not exist before. Further studies are however necessary before more permanent arrangements can be made. There is still no national service for women.

Some modifications and reorganisation will be necessary both for the medical and religious services. Committees have been appointed to investigate how more modern and efficient services in these fields can be set up.

Royal Netherlands Navy

The strength of the navy was laid down in the previous defence plan of 1974 (see Table 3). Much has been done in the past 10 years to bring the fleet from a force based on immediate post-war plans, and which it would be impossible to replace on a one-to-one basis, to a modern force that could fulfil its NATO tasks in a modern naval environment. On the other hand, it was not possible, or necessary, to replace every ship and aircraft. Therefore, units which were adequate in 1974, will, in the coming 10 years, have to be replaced. Details of how this is to be achieved are contained in the 1984 plan.

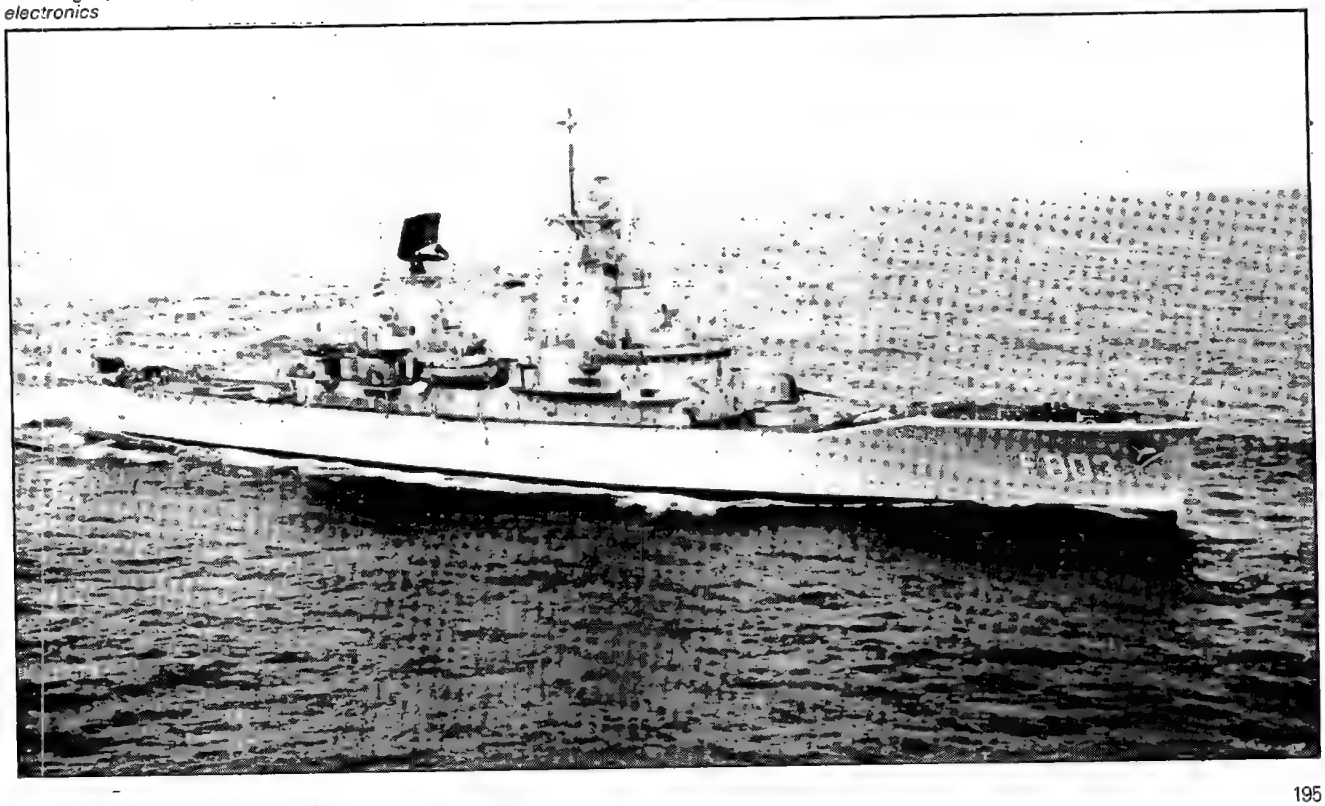
Table 3

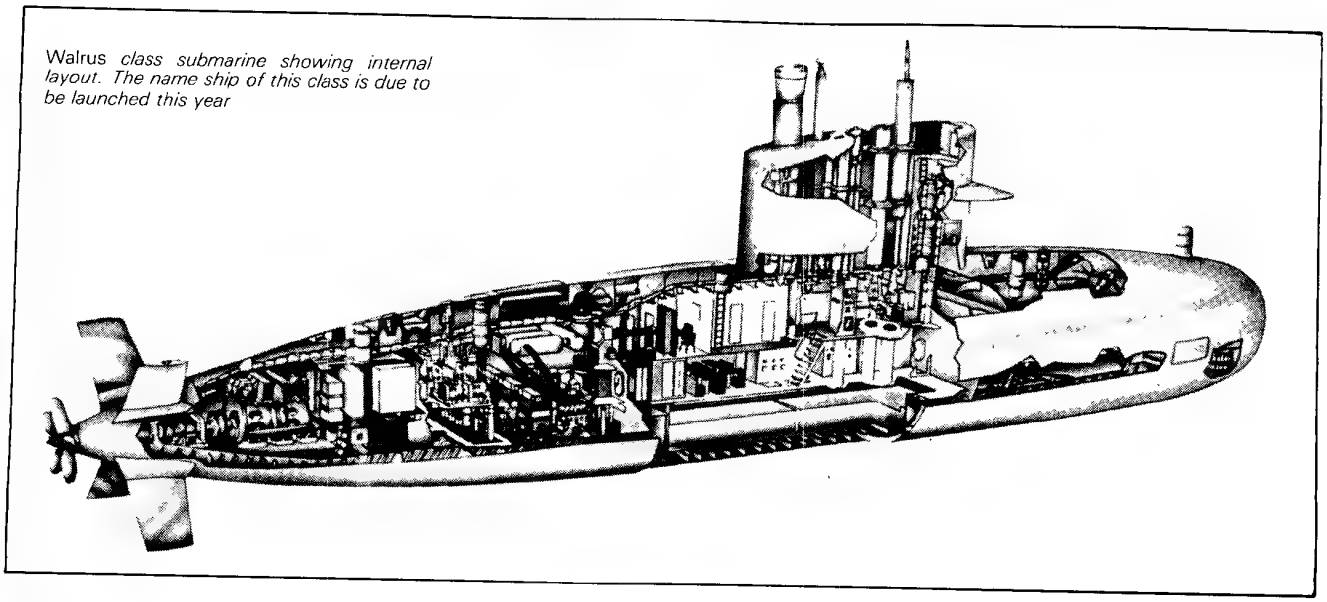
Fleet Plan Royal Netherlands Navy 1974

3 escort groups (2 Eastlant, 1 Channel) each consisting of 1 air defence/flagship frigate, 6 ASW frigates, 1 fleet supply ship
1 escort group North Sea, 4 ASW frigates
6 conventional propelled submarines
21 long-range maritime patrol (LRMP) aircraft
36 helicopters for ship and shore service
2 groups of mine countermeasures ships each consisting of 12 ships and one group of 7 ships
Royal Netherlands Marines with two amphibious operational groups (= commandos) and one cold weather company, all operationally integrated with the British Royal Marines
3 hydrographic and oceanographic ships
A number of smaller and auxiliary units

▼ *Lynx helicopter of the Royal Netherlands Navy Fleet Air Arm. This is the standard type helicopter in use with the navy*

▼ Van Galen, *second of the six* Van Speijk *class frigates after her MLM with the new OTO Melara 76 mm gun, ASW torpedo tubes aft and Signaal electronics*





Walrus *class submarine showing internal layout. The name ship of this class is due to be launched this year*

A major difference, and one to which there is undoubtedly some opposition in The Netherlands, is that there is no actual fleet plan. There is no regulation to be approved by parliament which says that the fleet is to consist of so many frigates, MCM vessels, submarines, aircraft and other units. This is indeed a major weakness of the proposals, a weakness which also applies to the other branches of the armed forces. The 1984 plan muddles along with what is intended to be built and in the process also mentions that certain units will be retired but gives no firm goals which the government is aiming for. This makes it virtually impossible for parliament to keep a close check on the exact equipment strength of the forces.

Atlantic-Channel

The Royal Netherlands Navy consists of an ocean-going and a coastal component. A war at sea is fought to obtain command of the sea, denying its use to the enemy. In practice, the main use is trading with overseas countries and bringing in what is necessary for the pursuit of war. The navy will concentrate its efforts on protecting the flow of supplies and for this purpose will make available to NATO its ocean going component for use in the Atlantic and Channel. This will consist of escort groups for close escort, long-range maritime patrol (LRMP) aircraft for anti-submarine warfare (ASW) and reconnaissance, submarines for underwater anti-submarine warfare, and an amphibious element.

Table 5 shows that by the end of 1983 the following ships were available for escort duties.

Ten *Kortenaer* class Standard frigates completed since 1978

Two *Tromp* class guided weapon destroyers completed in 1975-6

Six *Van Speijk* class (*Leander* derivate) frigates MLMed 1977-83

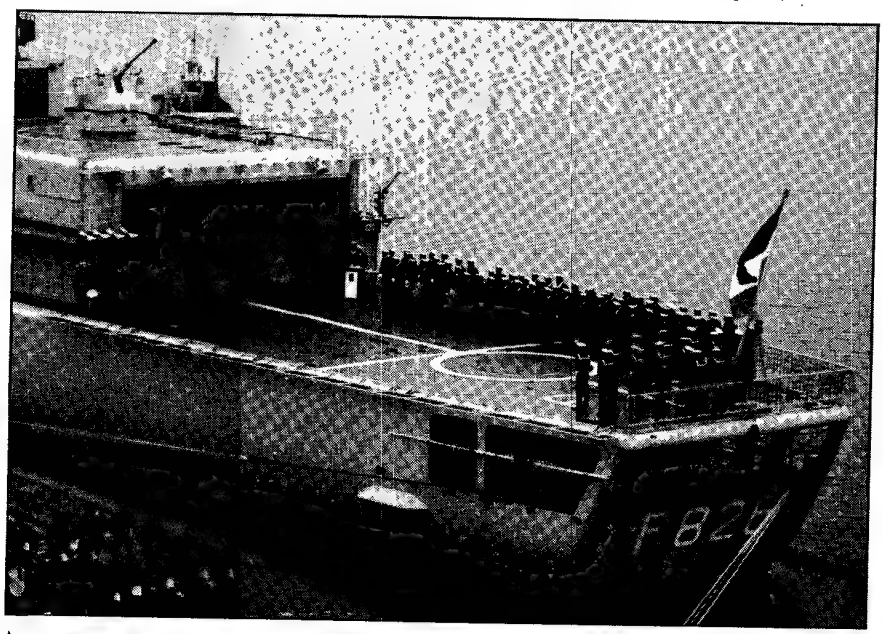
Two *Heemskerck* class Standard air defence frigates under construction to complete 1985-6.

Six *Wolf* class small corvettes completed in 1954.

The plan states that the six corvettes are now without any fighting value and will be deleted this year. Four new frigates were ordered late in February to replace these corvettes. These frigates will be of a new design called 'Multi-purpose' or 'M' class. At the same time, an option will be taken on a further four ships which should also be completed before the end of the plan period in 1993. The *Van Speijk* class frigates will then be deleted. Of other escort ships it is stated that the two *Tromp* class ships will start a mid-life modernisation (MLM) programme in 1988 and will be followed immediately by the *Kortenaer* class. Thus, it is hoped that the Royal Netherlands Navy will have a strong, modern escort force until the end of the century. However, if all six *Van Speijks* are scrapped, there will be a shortage of three ships by 1993.

War at sea is three-dimensional. The air component consists of shore-based LRMP aircraft and embarked tactical aircraft. The LRMP situation at the end of 1983 was that out of 21 aircraft required in the plan there were six Atlantic aircraft, bought a number of years ago, which had not given particularly satisfactory service. To replace the obsolete Neptunes, all deleted by the end of 1983, an order for 13 Orions had been placed in the USA, nine of which had been delivered with the remaining four to follow in 1984. The intention is that the remaining Atlantics will be deleted in late 1984, so that only 13 Orions will then be available. There are no funds available for further purchases until very near the end of the plan period when it is hoped to order a further two. So the advance of shipbuilding orders due to the government saving the Royal-Scheldt Company from bankruptcy, has had a serious effect on the LRMP strength with eight aircraft short, out of 21.

The story of embarked aircraft is little better. The fleet plan required 40 embarked ASW helicopters, later reduced to 36 when the *Heemskerck* AD frigates, without



▲*The last of the 10 Standard frigates,* Pieter Florisz, *was commissioned on 1 October 1983*

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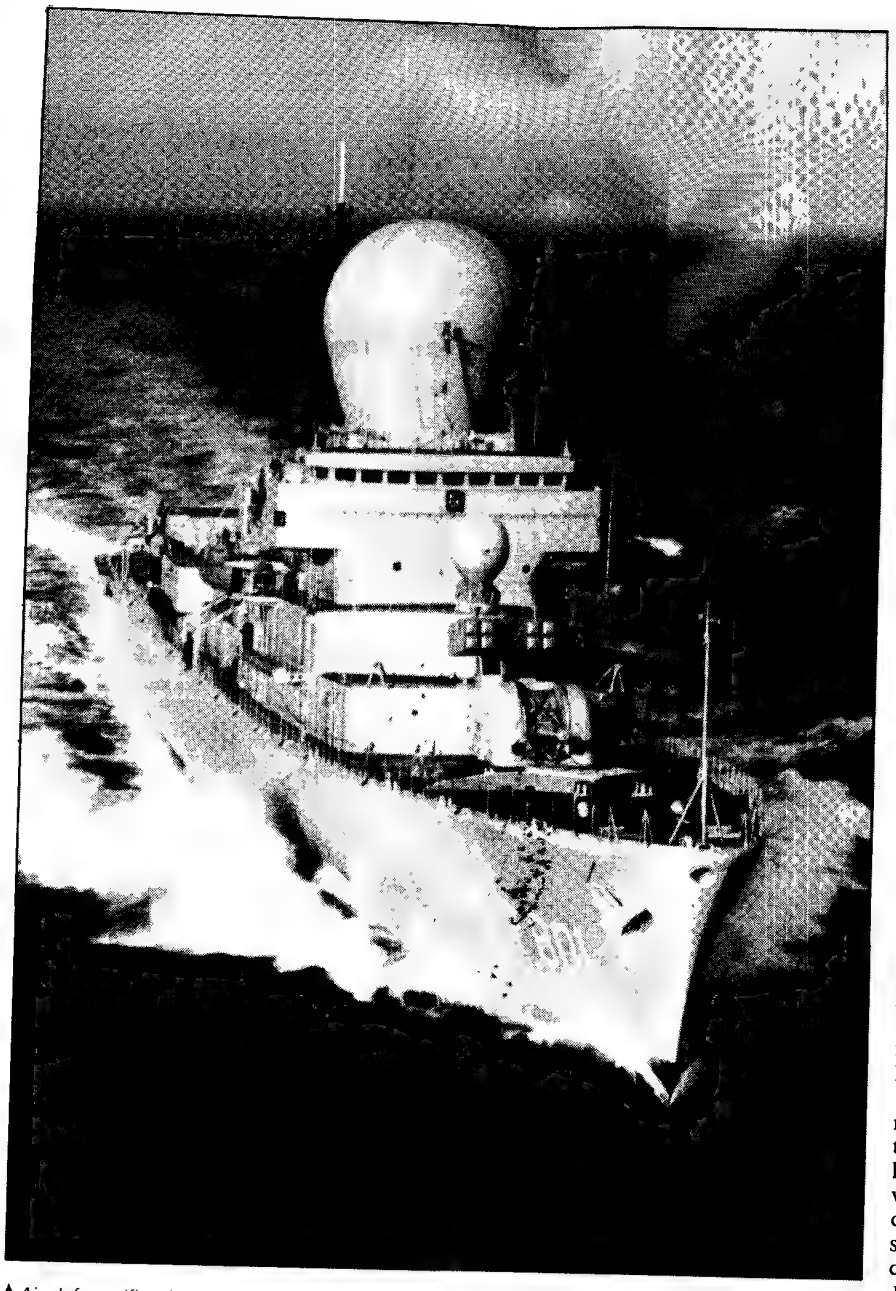
Table 5

Strength of Royal Netherlands Navy

	1974	*1984*	*1988*	*1993*	*Remarks*
Frigates					
Air defence *Tromp* class	(2u/c)	2	2	2	MLM 1988-90
Air defence *Heemskerck* class	—	(2u/c)	2	2	Completed 1985-6
ASW *Kortenaer* class	(12 ord)	10	10	10	2 sold to Greece
ASW *Van Speijk* class	6	6	6	—	MLM 1979-83
Destroyers *Province* class	12	—	—	—	
Corvettes *Wolf* class	6	6	—	—	
'M' class	—	(8 ord)	1	8	
Submarines					
Triple cylinder *Dolfijn* class	2	2	—	—	
Triple cylinder *Potvis* class	2	2	2	—	MLM 1987-8
Zwaardvis class	2	2	2	2	
Walrus class	—	(2u/c)	2	4 (+2u/c)	
Fleet supply ships					
Poolster/Zuiderkruis	1	2	2	1	
New type	—	—	(1 ord)	1 (+?u/c?)	
LRMP aircraft					
Neptune	13	—	—	—	
Atlantic	8	6	—	—	
Orion	—	13	13	15(?)	
Helicopters					
Wasp	10	—	—	—	
Lynx	-	22	22	22	
New type	—	—	—	—	
MCM vessels					
Hunters *Dokkum* class	4	3	—	—	
Hunters *Alkmaar* class	—	7	15	15	
Sweepers *Dokkum* class	11	11	6	—	
Sweepers new type	—	—	—	6(+??u/c)	
Inshore sweepers	16	—	—	—	Deleted 1983

▲ *Royal Netherlands Marines during field exercises. Co operation between British and Netherlands Marines is extremely close*



▲*Air defence/flagship* Tromp, *flagship of one of the task groups, will have an MLM as from 1988*

embarked aircraft, were ordered. It was decided to standardise the Royal Netherlands Navy on Lynx helicopters. In several batches 24 were ordered, including six for shore-based utility and search and rescue. They have all be delivered. Two have since been lost. It is stated in the fleet plan, very rightly, that modern developments point at air operations much further from the ships and therefore larger helicopters will be needed. From 1989 it is hoped to order eight large helicopters of a type as yet undecided. There are no references to the Falklands (Malvinas) campaign, showing clearly that operating at sea under some distant air 'umbrella' is a fallacy. For the type of operations foreseen with The Netherlands task groups, a few AEW helicopters and VTOL fighters are very necessary. The 1984 plan tells us nothing about such aircraft.

The other side of the third dimension shows a more cheerful picture. The four triple cylinder and two *Zwaardvis* class submarines have been serving faithfully. The first two triple cylinder boats are ageing, but replacements, the first two *Walrus* class boats, an improved *Zwaardvis* type, are getting on well although delayed by the RSV bankruptcy. Two more were ordered in January in order to replace the second pair by the end of the 1980s. The two *Zwaardvis* class will also receive a limited MLM in the late-1980s and be replaced in the late-1990s by two further improved *Walrus* class.

The Royal Netherlands Marines have also emerged fairly unscathed from the exercise. The existence of a third commando (manned by reserve personnel) was revealed, presumably for the new task of helping to defend 'Atlantic Islands'. This had been rumoured for some time, but it has now been confirmed by the government. This year portable air defence weapons will be issued to units but regrettably there is no question of the very necessary amphibious lift ship(s). It is clearly stated no finance will be available and it is to be investigated if it would be possible to incorporate an amphibious lift capability into future fleet supply ships.

There are currently two fleet supply ships, one which is still fairly new and one *Poolster* which will have to be replaced by the end of the plan period. Funds for this replacement have been reserved at the end of the plan period but financing the very necessary third ship is still doubtful and it may have to wait until after 1993.

Coastal

The forces mentioned in this group are those which operate in the shallow waters of the North Sea, and consist of mine countermeasures vessels (MCMVs) to keep channels open, frigates to escort the convoys, patrol craft and other vessels. As shown in the accompanying tables some frigates mentioned under ocean forces will be operated in these waters. The Royal Netherlands Navy currently owns five small coastal patrol craft, but these are getting old and will be deleted in a few years without replacement. Wartime needs for patrol vessels will be met by requisitioning in the civilian sector. Special mention is made in the plan of a new torpedo trials vessel that can also serve as a minelayer. It is to be ordered this year to replace the ancient former ex-US fleetsweeper *Mercuur*. The three survey ships, one ocean-going and two smaller ones are fairly new, though the latter are to receive an MLM in the mid-1980s.

Total MCM forces in mid-1983 numbered only an inadequate 18 ships of the nearly 30-year-old *Dukkum* class: four hunters, eleven sweepers and three diving vessels. However 15 tripartite hunters were on order at Van der Giessen-de Noord shipyards. The first three were delivered during 1983, number four followed in January and the fifth commissioned in April with two more to follow this year. Van de Giessen-de Noord has certainly pulled out all the stops and the Netherlands' programme is now far ahead of the French leadyard, which is working on only three vessels, to be completed by the end of 1984.

The 1984-93 plan informs us that after this year completions will be at a rate of two a year, thus completing the tripartite minehunter programme by 1988. In waters like those of the North Sea, shallow and sand with strong currents, mines easily get buried in the sand and cannot be hunted, which is why sweepers will be kept on and new sweepers will be acquired as from 1988: type and numbers (up to 15) will have to be decided. The only thing the plan does not tell us is how it is planned to dispose of mines in the many waters that are too shallow for these ships, now that all inshore sweepers have been deleted from the navy list.

DETRAS military training aids

Terry J Gander

DETRAS TRAINING AIDS Ltd at Alresford, Hampshire, is the home of a number of remarkable military training aids that are now being produced by this small but innovative company. The name DETRAS (Defence Training Aids Specialists) is not immediately familiar to the average reader of military literature, but during 1984 this is certain to change. After making a quiet but considerable impact on the military training aid market in several NATO countries since 1975, the company is now determined to make its name more generally known.

Turning and Moving Target System

One of the first small arms training aids DETRAS produced was the Turning and Moving Target System (TMTS). This is a conventional turning and moving target system but uniquely combined in one moveable frame that operates off a normal mains supply and provides automatic or manual operation of three, four or five turning targets and one moving target.

Police Film Target System

Closely allied to the TMTS is the DETRAS Police Film Target System (PFTS), but this type uses a film projector to project film targets on to a screen. A 16 mm projector is used for moving film target projection. When a round is fired at a moving target, the motion of the target is frozen at the instant the bullet would have reached the apparent target, and rear illumination behind the screen shows the bullet hole and target positions denoting the point of bullet impact. The first DETRAS PFTS equipments were installed during 1977. Since then they have been in service with several British police forces.

Military Film Target System

This system can be used to project either moving or stationary targets on to a wide-angle screen and can be used with all infantry small arms and anti-tank weapons fitted with sub-calibre firing devices. The MFTS has been used by NATO armies for many years. The first MFTS was installed at Wiesbaden, West Germany, in 1976 and since then it has been used by the US Army Europe, with infantry and other units, and more DETRAS MFTS equipments have been purchased by the US Army, the Canadian Armed Forces and the British Army.

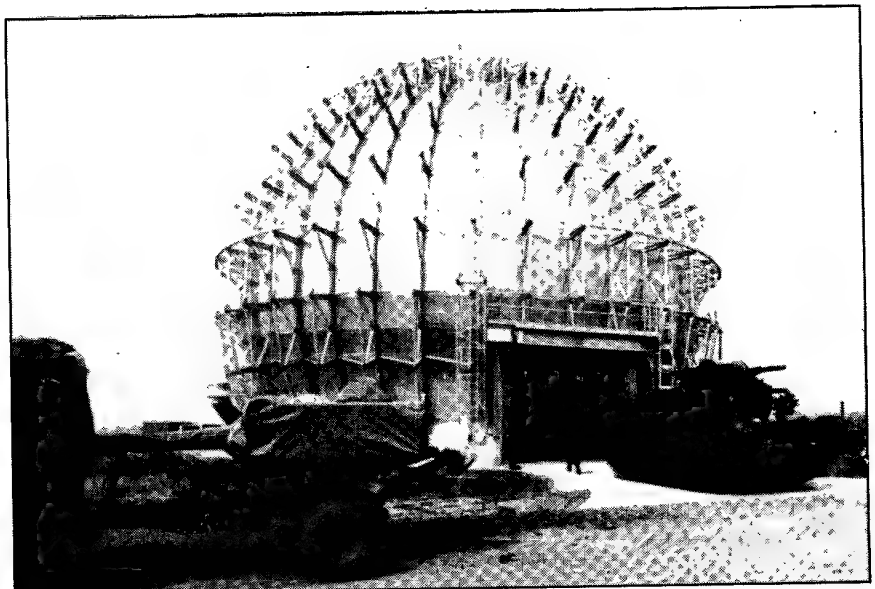
The MFTS uses a rear illumination contra-moving paper wide-angle screen on to which a moving target picture is projected. When a round is fired the screen stops to provide an immediate visible result. The correct time-of-flight from weapon to apparent target range and fall-of-shot simulation for the appropriate weapon is applied by means of tilting the film projector according to the target range and type of weapon/ammunition. The DETRAS MFTS was the first film target system ever to use and patent the automatic presentation of the result at the instant of bullet impact on the target, by means of an automatic selection of weapon type and projectile ballistics and target range at the instant a weapon is fired. These are immediately integrated to present an accurate result on the screen. All previous film target systems required a manual setting of projectile time-of-flight and trajectory when a weapon was fired, which was always impractical and led to inaccurate use and results. The DETRAS MFTS uses either manually set or automatic target range and selection only.

The MFTS was also the first system to incorporate the DETRAS Twin Stationary Target Equipment (TSTE) for use with the same film target system. First introduced in 1977, the TSTE has since been delivered to the US Army Europe with a fully solid-state (no tape recorder mechanism) user programmable control system. Full fall-of-shot simulation is incorporated in the TSTE. The DETRAS concept was formally tested by the US Army and approved for zeroing, record fire and skill qualification tests. Originally, the TSTE system used two Kodak Carousel 35 mm slide projectors but the latest version uses two Simda 2200 35 mm slide projectors as these have various technical advantages over the Kodak equipment. Each of the projectors completely fills the 4·5 x 1·6 m screen; one projector has slides of the appropriate backgrounds and the other is filled with slides of the background and targets: DETRAS field fire, record fire, skill qualification test, sustainment fire, grouping targets and nomination targets. This supplied set has also been approved by the US Army. With the latest TSTE system, the user has the option of projecting the standard programs or programming specialised sets and sequences of targets, as and when required.

Tank Gunnery and Missile Target System

The Tank Gunnery and Missile Target System (TGMTS) has been designed and patented as a training aid for use with either a main battle tank or anti-tank guided weapon launcher. The equipment requires no expenditure of ammunition and uses an eye-safe laser and associated electro-optical components to display time-of-flight, fall-of-shot and drift of various types of ammunition. Ballistic data for the ranges and types of ammunition is stored in micro-electronic data banks inside the device. The device has been in service with the US Army since 1978.

The TGMTS is used inside a building that has access for the MBT or A/T missile launcher to be used. It uses a back projection screen placed mid-way between the MBT and the control console on which can be mounted a modified 16 mm film projector. The screen can be raised or lowered to suit the particular AFV involved. The TGMTS uniquely permits the normal use of an MBT complete fire control system. Films of suitable armour targets can be projected on to the screen and provide the gunner and commander with realistic target movement and clear, recognisable images. The target image is engaged by normal fire control procedures



▲ *Exterior of the DETRAS Anti-Aircraft Target System (AATS) dome during an equipment change-over from a towed Vulcan air defence system (left) to a Chaparral (right)*

and on firing, the eye-safe laser shows the tracer effect and the results of the engagement in real-time simulation. Very astute gunnery skills are required when using the TGMTS.

An instructor can control the complete system using a single remote control unit that can be fitted to a wander-lead, if required. The instructor can observe the training from any position or even act as the tank commander, if appropriate. MBT laser rangefinders can be used normally and safely at full field power by means of the DETRAS Laser Range Simulator (LRS). Alternatively, if a laser rangefinder is not fitted, MBT optical stereoscopic rangefinders can be used with the TGMTS by means of the DETRAS Stereoscopic Range Simulator (SRS).

The TGMTS is in service with the US Army both in the USA and Europe. It is also in service with the Turkish Army and has completed trials with the British Army.

Helicopter Anti-tank Target System

The Helicopter Anti-tank Target System (HATS) is a derivative of the DETRAS TGMTS. It is used for air-to-ground missile gunner (operator) training. It uses much the same components as the TGMTS and can be supplied either as an interface with an in-service helicopter in a hangar, or as a completely self-contained training system with the appropriate missile sight fitted to a moving cockpit mock-up. HATS has been supplied to all the West German Army *Heeresflieger* regiments (for use with the MBB Bölkow 105 helicopter/HOT missile). It has also been supplied to the British Army Air Corps.

Anti-Aircraft Target System

In more ways than one, the Anti-Aircraft Target System (AATS) is the largest of all the DETRAS training aids to date. It is a self-contained anti-aircraft training device for use with all types of anti-aircraft gun and ground-to-air missile. It operates by projecting one or more independent aircraft target images and convergent heat spot (target infra-red signature) on to a spherical screen.

The AATS is housed in a purpose-built aluminium dome screen structure with an internal diameter of 20 m and an internal height at the apex of 16·5 m. The method of construction is in itself a structural engineering innovation and has been designed to comply fully with the relevant British codes of practice and the structural engineering regulations of various other nations. With the dome screen being the shape of a partial sphere it enables the target projection equipment to be placed at the geometric centre of the sphere with the projector on the end of an angled arm or gantry. The entire AATS is air-conditioned so training can be carried out throughout the year in any climate.

Target images are projected onto the inside surface of the dome screen over a swept area of 360° x 260° from a video projection unit mounted 6·5 m above ground level. During the development of this projection unit DETRAS was unable to find a video projection unit which met its requirements so it designed and built its own. Video was selected as it permits extreme flexibility in control of the target image and an instructor can change sequences more rapidly than with a film system. Target flight paths are stored on video tape played from a professional video cassette player housed in the instructor's control console array. The DETRAS AATS is capable of projecting dynamic targets on to the screen independently and simultaneously. The flight paths contain sequences of varying degrees of difficulty including profiles of attacks directly over the weapon position. Another unique feature is that the AATS shows the full flight from launch of a guided missile to target impact or missile self-destruct. Target destruction is also shown. Alternatively, projectile trace from an AA gun can be displayed.

The AATS can be used with virtually any anti-aircraft AFV that can be driven through the entry door, for once inside the structure, the 6·5 m height of the video projector allows adequate room. To date, the AATS has been developed to interface with Chaparral, Stinger and the Vulcan air defence system. With no modification to the basic equipment, the AATS can interface with 35 mm Gepard, 35 mm Caesar, 40 mm DIVADS (Sgt York), and the Bofors 40 mm L/70 and the Oerlikon 35 mm guns.

The AATS has been supplied to the US Army Europe and another more technically advanced equipment is under construction for the Royal Netherlands armed forces.

▲ *View through the main door of the DETRAS AATS showing a Chaparral launcher in position with the video projector positioned centrally above the launcher*

▲ *Scene inside the AATS with the video projector poised above a Chaparral launcher*

Conclusion

The above-mentioned range of training equipments is wide and innovative but DETRAS does not stand still for long and more technically advanced products are in the pipeline. When they appear, they will no doubt have an effect on the training techniques used by various armed forces quite out of proportion to the numbers actually produced, for many of the equipments or technical features produced by DETRAS were the first in the field. The company holds various patents concerned with the devices that are now an integral part of systems produced elsewhere.

Ship-to-shore telegraph

MARCONI SECURE Radio Systems is developing a ship-to-shore automatic HF telegraphy system under a £3·3 million MoD contract. The shipborne element is being produced by the contractor and the shore station will be the responsibility of Marconi Communications. The contract follows the competitive project definition phase undertaken by several companies under the auspices of the Admiralty Surface Weapons Establishment.

Under the terms of the contract, two complete shore facilities will be provided. Each will consist of a receiving station with col-located interference monitoring equipment, a remote sounding transmitter station, and a control station. Ships of the Royal Navy that use Marconi ICS3 HF radio communications equipment, together with some submarines, will be fitted with onboard equipment developed under the contract. Deliveries are expected to begin in late-1987.

When the equipment enters service, it will provide an improved, fully automatic method of determining and selecting noise-free channels in the HF maritime mobile bands. It will largely eliminate the laborious and time-consuming method currently employed, which relies on the ship's Communications Officer consulting HF prediction charts and manually switching to channels that are, hopefully, noise-free. By using the channel evaluation and monitoring facility there will be a ship-to-shore frequency instantly available for use at most times in each of the maritime mobile bands.

Ferranti to equip Upholder submarines

FERRANTI is continuing its monopoly of Royal Navy submarine action information and fire-control system contracts with the announcement of the production order for the new *Upholder* (Type 2400) class conventional submarines. Ferranti Computers has already undertaken the related development contract, and the new system, designated System DCC by the RN, is a successor to the similar Ferranti equipment found in all the RN's nuclear submarines. Models of the export version, known as KAFS, have been ordered by one customer, Brazil, for its West German-built Type 209s, three of which are on order.

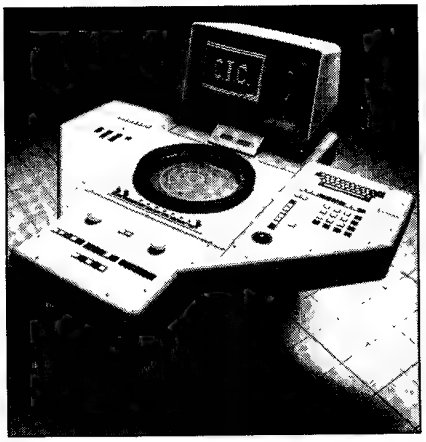
System DCC controls multi-weapon salvoes of either wire-guided torpedoes or under surface guided weapons at targets selected from the many contacts which the system can and display. A high level of automation from sensor inputs, from picture compilation and target motion analysis to auto-guidance modes, considerably reduces the number of operators from that required by other systems and, just as importantly, reduces crew training times. Its ability to sort, store and display on demand data from an extensive range of sophisticated sensors provides a powerful command system.

The full range of action-information-organisation and fire-control facilities is available at each of the multi-function displays. System integrity is maintained with dual redundant processing incorporating the latest computing elements and modular software.

Elbit trainer delivered

THE NAVAL Combat Information Centre Procedure Trainer, developed by Elbit for the Belgian Navy (*JDW* 7 July), was recently delivered to the customer. The trainer simulates situations in the classroom which, although possible in times of conflict, cannot be normally reproduced at sea, using realistic equipment which is as near identical as possible to that in Belgian ships.

The trainer comprises two trainee cubicles and a control room; each cubicle simulates one vessel.



IN BRIEF . . .

COMBAT VEHICLE FIRE-CONTROL SYSTEM: Ferranti Computers is collaborating with Kollmorgen of the USA to market a combat vehicle fire-control system based on the Ferranti Falcon FCS and the Kollmorgen Type 220 integrated day/night laser sight. This, says Ferranti, is so the company can exploit market areas in which the American firm is strong, and *JDW* sources indicate that the Falcon/M20 combination are favourites to win a contract to re-equip the Pakistan Army's Chinese Type 59 MBTs. Trials are said to be going very well but a decision may be some time yet. Pakistan has about 800 Type 59 MBTs.

MORE E-3 SIMULATION WORK FOR REDIFFUSION: Rediffusion has won a $4 million contract to supply a Novoview SP1 computer generated visual system, a six-axis motion system and other equipment to the Boeing Military Aircraft's new full-flight E-3 AWACS simulator, to be built at the US Air Force Tinker AFB, Oklahoma. This contract follows one recently announced, valued at $9 million, for the supply of equipment by Rediffusion for the on-site update of the existing E-3 simulator complex at Tinker AFB.

STORES MANAGEMENT: Communications Data of Hastings, England, is to develop further its work on a standard digital interface for aircraft stores management systems under Phase 2 of a £2 million, 30-month contract recently awarded by the US Air Force. In Phase 1 of the programme, Computing Devices competed with Grumman Aerospace in developing the initial theory and documentation, and Phase 2 involves developing prototype systems from the Phase 1 studies. The new system will permit any store or ordnance complying with the NATO STANAG 3837 AA standard to be fitted to any compliant aircraft, and all future NATO stores-carrying aircraft and stores will be designed to that standard, which also requires incorporating the three digital electronic MIL-STDs 1750, 1815 and 1553 in such designs.

SOFTWARE QUALITY CONTROL: This will be the responsibility of a new group at Yard Ltd, the Glasgow-based consulting engineers. Using Quality Plan techniques, Yard says that costs can be strictly controlled during programme development, reducing risk and increasing customer confidence in the end product.

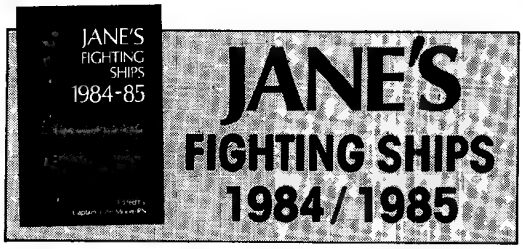
RASTER DISPLAYS: The Canadian Navy's six 'City' class patrol frigates are to have displays developed by Computing Devices of Ottawa, Canada. The high-definition multi-function colour raster-scan displays will form part of the ships' Shipboard Integrated Processing and Display System (Shinpads); contract value is $22 million.

NAVAL SOFTWARE: Two US Navy contracts (total value $9·2 million) have been awarded to Ocean Technology of Burbank, California, for the development of software programs. The first, from the Naval Ocean Systems Center, is for the development of operational software for applications and simulations programs for surface ship ASW control systems software; the second, from the Naval Underwater System Center at Newport, Rhode Island, is for submarine weapon system product engineering, logistics and software management.

FOREWARNED IS FOREARMED

USS Ticonderoga is 'first of class' of 8 guided missile cruisers, in the non-nuclear propelled AEGIS armed vessels programme. A further two ships have been ordered with five more projected. 'Ticonderoga' entered service with the USN fleet in 1983, followed by her sistership 'Yorktown' in 1984.

Jane's Fighting Ships new 1984/1985 edition is packed with accurate detailed information, research, photographs and classifications of all naval criteria. It is perfectly complemented by Jane's Defence Weekly, where you will find the very latest developments in this field and in defence matters internationally, reported and reviewed in depth the instant they happen.



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Bedford announces the TM 6-6 at last

ONE OF the surprises of the British Army Equipment Exhibition at Aldershot was the sight of the Bedford TM 6-6 in the static exhibition. Bedford has been very coy about announcing the TM 6-6, despite the fact that its existence has been known for some time, especially as the first pre-test prototype was completed in November 1981.

The British Army has for some years been contemplating the replacement of its current 10 tonne truck fleet. The army still has sizeable numbers of old AEC 10 tonne trucks and even a few Leyland 10 tonners of equal vintage. These trucks are still used as standard heavy-load carriers humping everything from ammunition to bridging, but they are now well overdue for replacement. The recent army procurement policy has been to make a new vehicle programme as low-cost as possible by adopting well-proven commercial designs and developing existing designs, so it comes as no surprise that for its heavy-load carrier fleet of the future the army has selected the TM 6-6 which is a developed version of the 4 x 4 TM 4-4.

The introduction of the TM 4-4 into army service has been so easy that the army has decided to develop the 6 x 6 TM 6-6. In simple terms, the TM 6-6 is a lengthened TM 4-4 with an extra axle, raising the load carrying capability to 14 tonnes, the equivalent of a combined TM 4-4 truck and trailer load. The introduction of the TM 6-6 in no way compromises the DROPS programme as this is intended mainly for supplying ammunition across country and direct to the front line. The TM 6-6 will deal more with the day-to-day loads that the army requires.

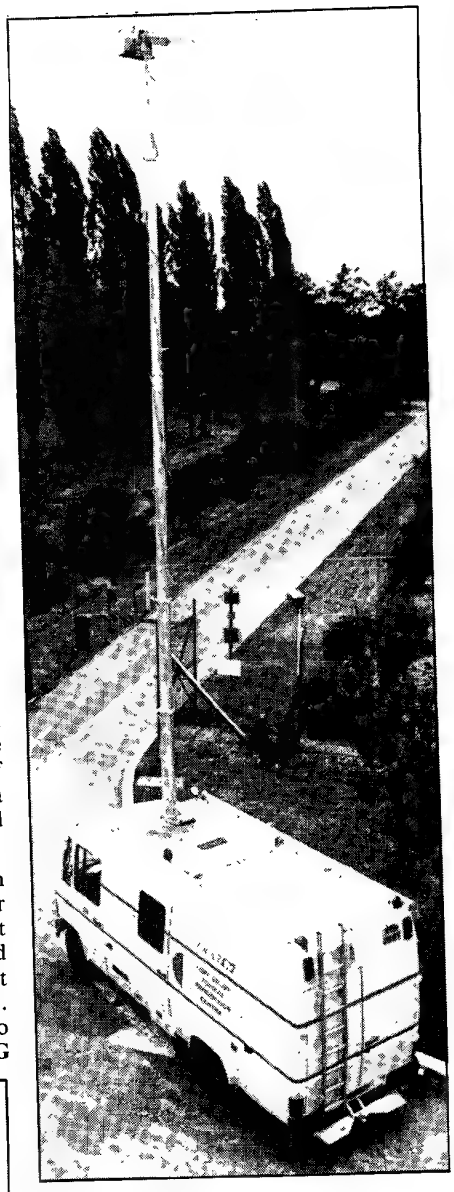
Not surprisingly there are many commonalities between the TM 6-6 and the TM 4-4. Both use the TM 4-4 cab design and the height and width of both are the same. As would be expected the load area heights are the same. Other items which the two have in common include the engine (an 8·2 litre diesel developing 206 bhp at 2500 rpm), cooling system, exhaust, front axle and suspension, steering wheels and tyres. The electrical and braking systems are modified to suit the 6 x 6 function. A new transmission is introduced on the TM 6-6 along with a new transfer box, rear bogie axles and their suspensions. The new transfer box provides permanent 6 x 6 drive and the ZF S6-80 gearbox provides six forward and one reverse gears.

Three basic versions of the TM 6-6 are planned. One will be the basic load-carrier with a standard cargo body that has been developed and manufactured by Edbro Ltd. This is a basic flat-bed with body sides, tail board, tilt and canvas covers. An alternative cargo-bodied version will also have a mid-mounted winch. This is a hydraulic winch manufactured by Hudson Whatron Ltd and can be used for recovery of loads of up to 10 tonnes to front and rear. A third variant will be a platform body version equipped with an Atlas hydraulic self-loading crane capable of lifting 1400 kg at a radius of 6·55 m. All versions will be fitted with a towing pintle and all the usual lashing and lifting eyes.

Following the TM 6-6 test prototype in November 1981 were a further four prototypes built during 1983. A further eight MoD validation vehicles will be completed during 1984 for MVEE and user trials that will start this year and extend into 1985. Volume production is scheduled to commence in September 1986. **TG**

▲ *Bedford TM 6-6 14 000 kg 6 x 6 truck*

New telescopic mast



A NEW RANGE of air-operated telescopic masts, the XT series, has been introduced by Clark Masts. The new units are said by the manufacturer to be particularly stable mechanically and to be compact when retracted, enabling them to be mounted vertically on vehicles.

The XT is available in three variants, having extended lengths of 10, 12 and 15 m, and each consists of eight telescopic sections. The masts are raised using air from a bottle or compressor. Apart from supporting surveillance cameras, for example, Clark Masts says the new masts are suitable for mounting thermal imaging systems.

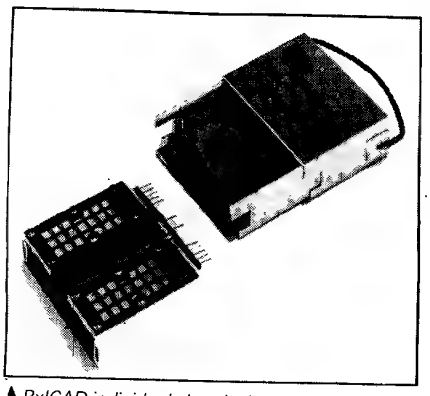
MANUFACTURER: Clark Masts Ltd, Binstead, Isle of Wight PO33 3PA, England.

Bendix miniature chemical agent detectors

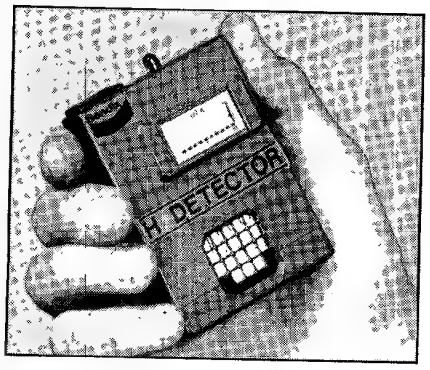
IN RECENT YEARS the miniaturisation of electronic components and circuits has become almost commonplace to the extent that virtually any electronic equipment that can be considered has become much smaller and lighter than was even dreamed of a few years ago. Miniaturisation has even extended down into the realms of chemical agent detection so that many armed forces are taking delivery of detectors that are already obsolescent as models which are far smaller, lighter and easier to employ in highly mobile warfare arrive on the NBC defence scene. A typical example of this is the Bendix individual chemical agent detector (BxICAD).

Bendix has recently introduced two miniature chemical agent detectors. One, the BxICAD, was unveiled at last year's USAEE in Washington, but a more recent product is the Miniature Mustard (HD) detector. Both these individual detectors are small enough to be worn as personal badges and consist of two basic components: the electronics module and a replaceable (disposable) sensor module. The BxICAD sensor module contains the battery power source and is designed for up to six months' continuous use. The sensor contains three independent interference-rejection techniques to eliminate false alarms and provides an alarm response to G and V agents, Mustard, Lewisite, Phosgene, Hydrogen Cyanide and Cyanogen Chloride. After the initial indication of an alarm the sensor automatically resets and can then be re-used.

The BxICAD weighs less than 230 grams and measures only 90 x 70 x 30 mm. In contrast, the Miniature Mustard detector weighs less than 150 grams and measures 90 x 60 x 20 mm. It provides an alarm response solely to Mustard and thus contains about half the circuitry of the BxICAD, but is otherwise similar in operation and use. On both, the electronics module is re-usable while the sensor module is disposable. The BxICAD has two alarms: one aural, the other a flashing LED indicator. After use it can be decontaminated by the usual bleach and water rinsing methods and no maintenance other than routine replacement of the sensor module is required. To date, both types of detector have been advocated as badges to be worn by personnel, but Bendix sees no reason why the devices cannot be used as detectors fixed to static locations such as personnel shelters and connected to an alarm system, or carried as detectors fixed to military vehicles. Bendix is already developing a training device using radio frequencies and the first prototype of this should be ready by the end of 1984. The BxICAD is undergoing trials with the US forces and with some NATO forces. The Miniature Mustard detector will enter laboratory evaluation during this year.
STATUS: Development.



▲ *BxICAD individual chemical agent detector with (above) the electronics module and (below) the disposable sensor module*



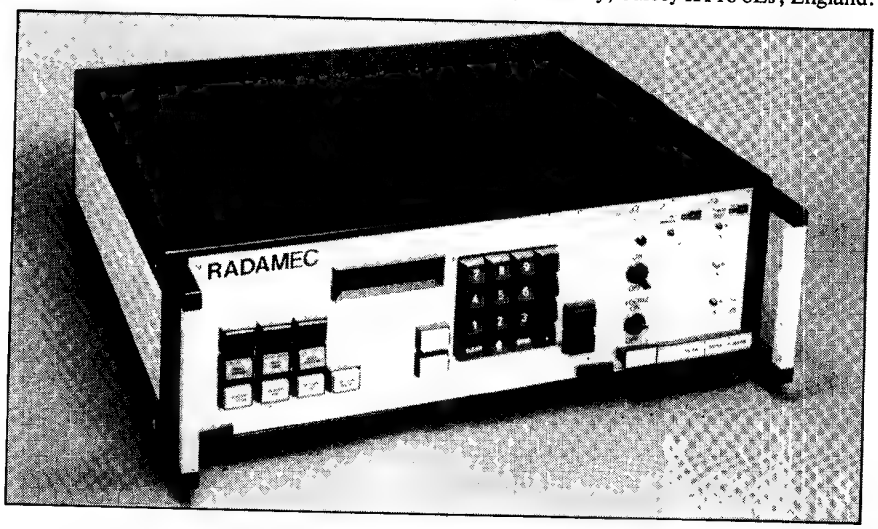
▲ *New Bendix Miniature Mustard (HD) detector*

MANUFACTURER: Bendix Environmental Systems Division, 1400 Taylor Avenue, Baltimore, Maryland 21204, USA.

Dummy director unit

FOR THE FIRST time Radamec has introduced a three axis capability to a dummy director unit. The microprocessor controlled, fully programmable solid state system can inject signals simulating the roll pitch and yawing motion of a ship or aircraft into electronic units being developed or tested, subjecting them to a full test cycle before installation.

MANUFACTURER: Radamec Ltd, Bridge Road, Chertsey, Surrey KT16 8LJ, England.



High-frequency modem

COSSOR has introduced a high-frequency modem, designated CTM1080, which is designed to provide reliable encoded or plain data transmission and reception in a battlefield environment.

The CTM1080 operates at data rates of between 75 and 2400 bits/sec with full forward error correction of up to 1200 bits/sec; both in-band and out-band diversity modes can be used.

The new unit is a development of Cossor's fast processor unit with the addition of special software functions and the forward error correction facility. Two of these processors are housed in the CTM1080, each of which can be programmed for different signal processing tasks. The tone library complies with MIL-STD 188C and electromagnetic compatibility is to MIL-STD 461A.

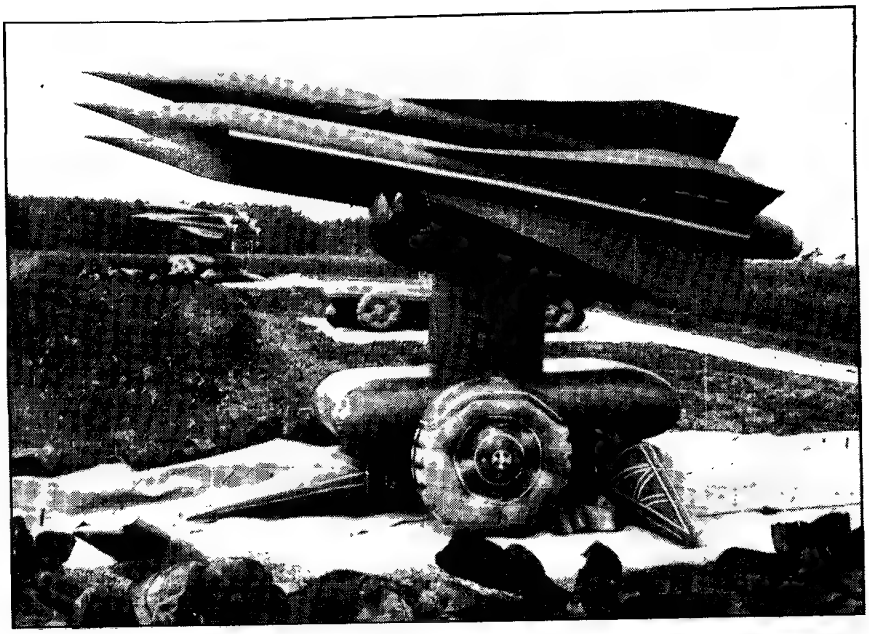
MANUFACTURER: Cossor Electronics, The Pinnacles, Harlow, Essex, England.

German firm builds inflatable decoys

A FORM OF military subterfuge, as effective today as it was in the Second World War when whole dummy airfields were created with lines of decoy aircraft, is the production of convincing looking missile batteries, aircraft and AFVs designed to mislead an enemy into thinking that a large force of modern weaponry is being deployed against him. Ballonfabrik Augsburg specialises in the design of a wide variety of sizes and shapes of balloon. Recently, it has extended its expertise to produce military decoys which, in either full or partial inflatable form, look very like the tanks, vehicles, aircraft and missile systems they are built to represent.

Parallel to this development work the company has produced coated textiles which give radar and infra-red reflections comparable to those of the genuine equipment. Inflation devices maintain the decoys at the optimum pressure. The coated textiles are shaped and cut in such a way that, when inflated, they closely resemble the original equipment to which they were designed. An electrically driven blower inflates the decoy and a pressure sensitive control stops the air flow as soon as the correct working pressure is reached. The blower restarts from time to time to maintain the shape of the decoy.

The decoys are secured to the ground by ground anchors and guy lines. Relief valves prevent damage from over-inflation caused by rising temperature. The decoys are transported in valises. At the erection site each unit can be off-loaded and erected by two men. Once unfolded the decoys can be rapidly inflated by their individual blowers and anchored in position.



▲ *Ballonfabrik Augsburg inflated military decoy*

A complete battery of anti-aircraft missiles consisting of nine units can be erected by as few as six to eight men in less than 60 minutes. Dismantling is even faster: the blower is disconnected and special deflation points are opened resulting in the swift collapse of the decoy. It is then readily folded and repacked in its valise.

Some parts of the decoy which do not necessarily lend themselves to inflatable simulation are made of folding rigid members. This combination of inflatable and rigid parts produces a decoy of remarkable likeness to the original equipment.

Cost sharing on EFA study

WHEN THE Defence Ministers of the five European nations interested in the development of the new European Fighter Aircraft (EFA) met in Madrid early last month and signed an agreement to undertake a formal feasibility study (*JDW* 21 July), they decided to distribute the work required in proportion to the number of aircraft that each country expected it would ultimately order. The share of the three major partners, West Germany, Britain and France, would therefore be around 23% to 26% each, writes our correspondent in Madrid.

Italy would finance some 15% to 19% and Spain some 8% to 11% of the total costs of the project. Orders are likely to be 250 units for each of the three major forces, 165 for Italy and 144 for Spain.

The Spanish Defence Minister said that any doubt about the country's participation in NATO would have no effect on Spanish interest in the EFA.

Italian computer consortium

AGUSTA, A MEMBER of the EFIM Group, and Selenia, of the IRI-Stet Group, have recently formed a new consortium to develop onboard processing systems for aeronautical applications. The first objective for the new consortium will be a data processing system for the EH101 ASW and transport helicopter under development by Agusta and Westland. The system will be based on a series of computers that will automatically process all the flight parameters and mission data of the helicopter.

The new consortium will be on a 50/50 basis between the two companies and will enable them to combine their respective experience. Agusta is, of course, a specialist in helicopter onboard systems, while Selenia has developed a series of data processors called 'Mara' in various versions for military and civil applications. The President of the new Agusta-Selenia consortium will be Ing Giuseppe Bertolazzi (Agusta) and the Vice President is to be Ing Nicolas Zalonis of Selenia.

Oceanics SPL

UK MINISTER of State for Defence Procurement, Mr Geoffrey Pattie, has officially opened the new premises in Farnborough of Oceanics SPL, a division of the rapidly expanding Oceanics Group. The 24 000 ft^2 (2230 m^2) factory greatly increases the production area available to the company, which also operates from another site nearby in Farnborough and from one in Gloucester.

Oceanics SPL is probably the leading company in the provision of TEMPEST protected fibre optic networks for the defence sector. The company also acts as sole UK distributor for CIT-Alcatel's range of advanced data communication products. At present, Oceanics SPL employs 75 people and had an annual turnover last year of £2 million ($2·6 million). Its immediate plans are to double its turnover year by year.

Among other divisions of the Oceanics Group displaying their products at the opening were Laser Engineering (Development), responsible among other things for the development of the hydropneumatic suspension system for AFVs, Air Log, and MPE, which has developed the Type Z trolley for loading JP233 munitions pods onto RAF Tornados.

Aérospatiale

AÉROSPATIALE is a major source of aerospace production, not only for France but also in European collaborative projects which account for 60% of the output for 1983. Total sales increased by 12% over 1982 but orders placed totalled only Fr12 875 million (£1160 million), some 18% less than the previous year. Exports accounted for 34% of deliveries, down from 61% in 1982, but 80% of the tactical missiles and helicopters were sold abroad. Military business provided 30% of the group aircraft sales but will become an increasing proportion if the civil market continues to stagnate. Over 56% of helicopters were sold to the military and, obviously, all the tactical missiles and much of the space production was for defence use.

The main group has a number of affiliates producing light aircraft, repairing and maintaining aircraft equipment, and, through SFENA which employs nearly 3000 people, designing and manufacturing electronic accessories. Overseas, Aérospatiale has other associates, mainly in the helicopter field, in the USA, Singapore, Brazil and Morocco.

The results for FY83 were disappointing, having resulted in a loss of Fr357 million (£30·8 million) compared with a profit of Fr96 million (£8·3 million) in 1982. This occurred largely because interest costs were up to Fr838 million (£72·2 million) from Fr325 million (£28·1 million) the year before. Current indications are that 1984 will not be any easier as deliveries are becoming more difficult and interest rates have yet to ease downwards.

The balance sheet is thus showing the effect of the downturn with higher capital employed, but resulting in a lower net worth of the group. Fixed assets are only marginally higher from the new investment as disposals are also in train. Stocks and work in progress are up by 20%, similar to cash balances but, with increasing obligations offsetting these increases, net current assets were only 16% higher at year-end 1983 compared to the year before.

Long term debt, which is borrowed principally from the National Credit Agency and French banks is marginally higher. Unrealised exchange gains and losses distort the figures somewhat but the final effect only crystallises as the obligations fall due.

The equity of Aérospatiale has thus declined in value by 11% during FY83 and it seems likely that the shareholders — the French Government through its nominees — will be required to provide additional funding once the 1984 results are available next year. This need not be in the form of share capital but could be introduced under the heading of 'Special Funds', already outstanding on 31 December 1983.

AÉROSPATIALE

Financial year ending 31 December	*1983*		*1982*	
	(Fr million)			
Revenue		%		%
Aircraft	8269	34·4	7770	36.3
Tactical missiles	4716	19·6	4300	20·1
Helicopters	7471	31·2	5504	25·7
Ballistics and space	3423	14·2	3657	17·0
Head office	146	0·6	191	0·9
Total revenue	24 025	100·0	21 422	100·0
Profit/(loss)	(357)		96	
Balance sheet as at 31 December				
Fixed assets	2949		2831	
Other assets	2019		2205	
Current assets	37 833		29 110	
Current liabilities	26 858		20 452	
Net current assets	10 975		8658	
Capital employed	15 943		13 694	
Long term debt	9781		8778	
Other liabilities	4320		2840	
Net worth	1842		2076	
Share capital	1016		1016	
Reserves	261		231	
Special funds	693		550	
Profit and loss account	229		183	
Profit/(loss) for the year	(357)		96	
Shareholders' equity	1842		2076	
Profit/(loss) as a percentage of:				
Total revenue	(1·5)		0·4	
Capital employed	(2·2)		0·7	
Shareholders' equity	(19·4)		4·6	
Debt:equity ratio	5·3:1		4·2:1	

Royal Marines to have fast aluminium boat

THREE FERRYMAN 18 fast military craft are due to be delivered to the Royal Marines this month. The Ferryman 18 is built by Freezer Aluminium Boats, part of the Emsworth Shipyard Group, at Hayling Island, Hampshire. This very strong trihedral craft was demonstrated at the British Army Equipment Exhibition at Aldershot earlier this summer. Within weeks of completing its initial trials, six of the Ferryman 18 boats had been ordered for survey work abroad and four more, in addition to the Royal Marines boats, had also been ordered. The Ferryman 18 is claimed to be much stronger and faster than an equivalent hull in GRP and is of similar weight and cost.

▲ *Ferryman 18 aluminium boat*

CONTRACTS

	Quantity	*Value*	*Contractor*	*Customer*
Development and production of ship-to-shore automatic HF telegraphy system	—	£3 300 000	Marconi Secure Radio Systems	UK MoD
Motor gearhead assemblies for Sting Ray	—	£875 000	Miurhead Vactric	Lucas Aerospace
Classified electronics	—	$5 000 000	GTE Systems	US Army
Classified electronics	—	$5 200 000	Geodynamics	US Army
Classified electronics	—	$5 100 000	Motorola	US Army
Operation of Independance, Mo, ammunition plant	—	$39 700 000	Remington Arms	US Army
Operation of Charleston, In, ammunition plant	—	$5 500 000	ICI Americas Inc	US Army
M36A1 machine gun mounts	1575	$3 700 000	Fraser Manufacturing	US Army
120 mm ammunition for M1E1 tank	38 620	$25 600 000	Honeywell	US Army
Technology demonstration of advanced integrated propulsion system	—	$36 400 000	Cummins Engine Co	US Army
Technology demonstration of advanced integrated propulsion system	—	$49 700 000	General Electric	US Army
Skipper rocket motors for laser-guided bombs	2000	$11 100 000	Aerojet Tactical Systems Co	US Navy
Gas turbine power units for CH-53 helicopters	77	$3 500 000	Solar Turbines	US Navy
Mine neutralising systems	6 (+12 option)	$30 100 000	Honeywell	US Navy
Overhaul of the USS *San Bernardino*	—	$6 100 000	RMI Inc	US Navy
Signal generators for electronic test equipment	161	$6 600 000	Cigotronics Inc	US Navy
Ship design engineering	—	$6 100 000	Rockwell International	US Navy
LRU-1 computers for F-4E/G radar	37	$5 100 000	Westinghouse	US Air Force
Radar warning receivers for F-15 aircraft	—	$24 100 000	Loral Electric Corp	US Air Force
International air transport services	—	$37 600 000	Northwest Airlines	US Air Force
International air transport services	—	$29 900 000	World Airways	US Air Force
International air transport services	—	$58 400 000	Flying Tiger	US Air Force
Support for MX system	—	$5 800 000	Thiokol	US Air Force
Spares for AN/ALQ-99E systems on EF-111A aircraft	—	$8 700 000	Raytheon	US Air Force
Installation of a fibre optic communications system in Korea	—	$3 300 000	AT&T	US Army
Turret and gun control modification kits to convert M48A1 tanks to M48A5	600	$5 500 000	Kemp Industries	US Army
Common Weapon Control System (CWCS) for ground-launched and sea-launched cruise missiles	—	$89 300 000	McDonnell Douglas Astronautics	US Navy

PEOPLE

Latest appointments

ARGENTINA
Army:
Gen Raul Frederico Schrimer, Deputy Chief of General Staff.
INDIA
Mr S K Bhatnagar, Secretary for Defence.
Air Force:
Air Marshal L M Katre, Chief of Air Staff, from 4 September.
Air Marshal Terence Joseph D Sa, Air Officer Commanding, Southern Air Command.
Air Vice Marshal B S Sikand, Commodore Commandant, No 10 Squadron.
IRISH REPUBLIC
Army:
Brig Gen Thomas J Walters, General Officer Commanding, Southern Command.
ITALY
Industry:
Sig Domenico Tatangelo, General Manager (Central Direction, General Secretariat, and Financial Department), Agusta.
Sig Arnaldo Antichi, General Manager (Helicopters, Aircraft, and Systems Operational Divisions), Agusta.
TAIWAN
Army:
Gen Wego Chiang, Commanding General, Combined Operations and Training Command.
Gen Wen Ha-Hsiung, C-in-C, Combined Service Forces.
UK
Royal Navy:
Rear Adm J J Black, Assistant Chief of Naval Staff (Policy), from October.
Capt T M Bevan, to be promoted to Rear Admiral and to be Assistant Chief of Defence Staff (Intelligence), from September.

PEOPLE

Capt J B Kerr, to be promoted to Rear Admiral, and to be Assistant Chief of Defence Staff (Operational Requirements), from September.

Army:

Brig T H Wheawell, Commander, HQ, 12 Signals Brigade.

RAF:

Air Marshal F C Hurrell, Principal Medical Officer, Strike Command.

Grp Capt B G Anstey, to MoD.

Grp Capt A J Chaplin, RAF Chivenor.

Grp Capt T F Dole, HQ, RAF Support Command.

Grp Capt J A Gates, HQ, NATO.

Grp Capt M V P H Harrington, RAF Swinderby.

Grp Capt J D N Kettle, to MoD.

Grp Capt J Reynolds, to MoD.

Grp Capt G A Sherman-Ball, to MoD.

USA

Army:

Maj Gen Jere W Sharp, Director of Contracting and Production, and Deputy Chief of Staff, Logistics.

Brig Gen James B Allen, Jr, Commanding General, 1st Infantry Division (Forward), Göppingen, West Germany.

Brig Gen Thomas N Griffin, Jr, Commanding General, Berlin Brigade, US Army.

Brig Gen Robert D Hammond, Director of Development and Engineering, Materiel Development and Readiness Command.

Air Force:

Maj Gen Claudius E Watts III, Director of Budget.

Maj Gen Harry A Goodall, Deputy C-in-C, US Readiness Command, and Vice-Director, Joint Deployment Agency.

Maj Gen William E Overacker, Deputy Chief of Staff for Operations, Military Airlift Command, Scott AFB, Illinois.

Brig Gen Robert D Patterson, Commander, 322nd Airlift Division, Military Airlift Command, Europe.

Brig Gen Alfred C Guidotti, Vice Commander, 21st Air Force, Military Airlift Command, McGuire AFB, New Jersey.

Brig Gen Anthony J Burshnik, Deputy Chief of Staff (Plans), Military Airlift Command.

Brig Gen Donald A Logeais, Deputy Chief of Staff (Logistics), Military Airlift Command.

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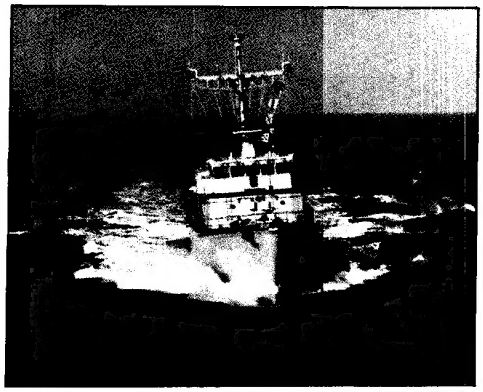
The tripartite minehunter a model for International Coöperation



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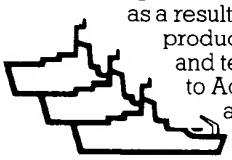

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